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Nature of reality

(meta)physics of the universe

How light travels? What is special in the H20? Quantum physics, black holes, neutron stars, dark matter, dark energy, ΛCDM, anti-matter, neutrinos, singularity, quarks and much more about the Cosmos: explained.

We set sail to the new horizons.

Teo Klima

Metaphysics of the Universe - Nature Of Reality

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Preface

In science, religion and art true pioneers are always those who expand existing horizons not those who travel parallel with them.

Average mind is concerned with average news served by mass media covering average topics like sports, politics, religion and commercials or streaming popular radio and tv shows. I notice one thing in common: there is no thinking, no brain usage - no purpose other than to entertain. Nothing important is done. People just sit and observe, laugh to primitive jokes, clap and nod. Mediocre vocabulary is obscure but how could people know anything when they are drowned in shabby journalism full of cliches?

Same people vote on elections and choose those who promote low passions, chauvinism, xenophobia and promises of better future. Politics and religion have common trait: they both promise better future. I want better now.

Surrounded by mediocrities I am suffocating in their averageness.

Common folks receive comfort hearing about afterlife. Truth is that no one knows, all religions speculate. When your loved one(s) die in horrible event you are relieved believing they went to Heaven. Calmly you proceed with your life, occasionally burn candle and pray while things return to normal: remarried, new family, new friends,... With time feelings soften, memories fade, eventually you forget those who you loved before because society pushes you forward. There is no time to vaste on contemplation of the past.

Now you are here, next moment you are there, stretched between obligations. If somehow you become mentally aware they immediately remind you of your duties. Can I reason in my free time? They ask what free time? We haven`t burden him enough. Give him more tasks to do. They ask what reasoning? All the answers have been disclosed, a long time ago, in holy scriptures which are written words of the God. Perhapse you disagree with the divine law? In that case you should remember how we tortured, poisoned, staked, incinerated and crucified those who disagreed with contemporary establishment.

I do remember and I despise imposed convictions. In absence of rationality you skip to violence, opression and punishment. Is there a nobler fate then standing for the justice until the end? Viva Socrates, hail Bruno! World remembers you - not those who condemned you because such characters are too common.

Well, today there is no need for old methods. Today they plant evidence, falsely accuse, discredit, declare insane, lock in suitable institution.

I am insane because I ask questions "how" and "why", I am insane because I seek explanations, I am insane because I want to be objective and rational.

I am insane because I do not accept standard norms of thinking. I respond that in science, religion and art true pioneers are always those who expand existing horizons not those who travel parallel with them.

I am insane because I venture beyond known, beyond possible. Tell me what is possible because you already know everything, right?

Society has predetermined my antish role. I am supposed to breed, work my ass off underpayed, obey and worship. I am not allowed to dream or write freely. I am forbidden to think.

Stupid is an idea that we are alone amid countless star systems: humans proclaim they are the only intelligent specie in the Universe. Pretentious and wrong! For certain, they are the only specie on Earth which accumulate riches beyond measure, vaste tones of food, kill, enslave, experiment and torture for personal benefit or entertainment. People are shocked seeing wild animals eat each other. Same people are not shocked how and to what extent live stock is treated in factory farms, butchered with cleaver and left to hang in freezer. People scream when someone accidentally walks over their lawn. They do not scream because rain forest, home of entire ecosystem, is intentionally burned and devastated. People in Africa die of thirst while in rich parts of the world people wash their cars and fill swimming pools. I have seen one state employee spilling water with no reason at all - simply because of negligence. Hypocrisy is the major mental illness world is suffering from.

Both individually and collectivelly, humanity needs to spiritually wake up, drastically change perspective, protect environment, become open minded and intellectualy progress. Without advance we are doomed for extinction.

Suffering is everywhere caused by wars, exhaustive overindustrialization accompanied with CO2 emissions, deforestation and junk production. Unhealthy, consumeristic lifestyle is dominant in one part of the world, famine in the other. Human race is subjugated to profit. Altruism and empathy are rare or mostly related to missionaries of faith which is not genuine action but stimulated with expected return in the form of spreading the religious influence among those who receive help.

I have never met a monster. I did met a bunch of monster-like humans. I have to live and work with such. Liars, savages, sadists. After commiting atrocity their face becomes distorted showing deformed smile. Confronted with their evil deeds they promptly counter attack. Why do humans invent monsters? Because they need monsters to look better themselves. In the absence of monsters, people are left with their own monstrosities. Same reason determines common depiction of aliens who are almost always ugly, unpleasant at best, dangerous, malevolent. Certainly, some alien species are

like that but not all.

I am willing to pay for every mistake I do after realizing what I have initially done and if I repeat the same mistake. Not for the mistakes I did before. They are embedded in my counsciousness and it is enough. I was not born with the life manual. How can I know about natural laws and empathy prior to learning? Learning by myself not in school. Education system has taught me nothing useful because it only offers stupendous amounts of unimportant data presented by average lecturers. Everything presented in this book, and much more, I have learned on my own.

There is no law but the supreme law of the Universe: every action has its consequence.

What is science? People do not distinguish between its basic principles and commercial or military exploitation. They think of it as malevolent agency. They consider respected scientists to be foreign agents who promote atheistic worldviews. Alfren Nobel didn`t invent dynamite to kill anyone - later misuse made it notorious. Manhattan Project wasn`t applied science department on the University - it was army program. Everything, including science, can be used or misused. Famous cosmologists do not talk about The Big Bang in order to deceive general public. They talk about it because it is well grounded theory, best suited model for Universe origin based on available evidence and our current understanding of nature.

State education curriculum does not follow contemporary science. There is no cosmology, no quantum physics. We are offered an obsolete set of data and superficial insight into reality. Almost nothing I am writing about doesn`t reside in school textbooks. I was surprised how many crucial facts were hidden from us. To make things worse, empirical knowledge is countered with religious class teachings. Young people are exposed to naive explanations instead taught to rely on objective truths. There is no cognitive development. Everything interesting and useful in life I learned by myself from personal experience and available literature. State education system is worthless, except reading and writing, not producing an enlightened individuals but

indolent morons.

I hear utmost nonsense all around. Citizens want to be protected during epidemic but they refuse to obey safety measures.

Many people have undeveloped communication skills. They do not understand clear expression or (malevolently) change meaning of the said, invent rumours and spread false gossip. Some people like to invent nicknames for others and ridicule them. Some like to pull things out of context and emphasize irrelevant parts.

Bullies always seek weaker victims, handicapped people and animals are often their targets. Human monsters put explosive in a poor animal body opening and ignite the fuse. Blast destroys half of the head or gastrointestinal tract, depending where an explosive was placed. Wretched animal drags itself away and dies in horrible pain. This monsters are called "little innocent angels who are just playing" and they are forgiven by local catholic priest after doing confession or a praying service. Goddamned religious fundamentalists! The world is contaminated with religion. Barbaric behaviour must not be accepted! Cruelty over animals and destroying environment should not be encouraged. Instead, belonging to the mainstream religious group protects savages. In extreme cases, it even gives them right to do atrocities.

Media is main contributor to the global fuss serving contradictory and biased information. This is either done deliberately, to favour the ruling political and ecclesiastic elites in order to secure own status, or data can be sneakily pushed forward by secret services.

Public discussions are full of meaningless, pointless, ineffective babbling. Take all the words used and you can not cure common cold or boil an egg but an empty talk goes on and on. The purpose is to cloud the facts, to blur the truth, to avoid scrutiny, to deter us from important issues and thinking.

Media topics stay totally unanswered or apparently solved and replaced with new ones. What is breaking news today shortly after, in a matter of days or weeks, disappears from the screen.

Terms denoting significant phenomenons receive extended definitions instead of introducing authentic classification. For example, there was strictly mathematical singularity which received physical connotation with the discovery of black holes, because this two is practically related, but then the same term was applied in technological sense. Now term singularity alone means nothing outside basic interpretation (unified quantity). In order to determine what you mean by it you must specify is it mathematical, physical or technological.

Fools... Less they know, louder they become! Less they have to say more they talk. Confronted with knowledge they claim they knew everything from the start while the most brazen of them will even claim they said it before you. Uninvited, unrelated to subject or lacking expertise, fools approach and interfere in conversation. The most dangerous fool is an ambitious one.

No public school or faculty makes you smart. They give you a piece of paper stating that you attained knowledge in the respective field. World is full of certified intellectuals and suspicious experts.

Many people prefer quantity over quality. They emphasize number of books someone has wrote and their extensiveness even use it as an argument to promote certain author. Then I remember writers like Lao Tzu and Sun Tzu who wrote only one slim book each yet creating genuine masterpieces, classics of literature, matchless sources of wisdom.

Some people are solely interested in form. They disregard the content and its meaning. Some people are looking for typos and when they find one then they triumphantly march around. Some people pull fragments out of context.

Most people repeat instead of being authentic.

Purpose of this volume is not to entertain or flatter. If you are looking for special effects then you are in the wrong place. Purpose of this publication is to discern the roots of existence, to answer the fundamental questions: what is the source of reality? Is there God? What is our role in the cosmic plane (if we have any)? And to explain the most interesting physical phenomenons discovered so far.

Introduction

If you search through Internet you will find that important informations are scattered across and that it takes time to detect a single precise answer. There are two preconditions before you can start exploring: having outstanding English language skills and a familiarity with the Web search tools yet both preconditions are fading away as time passes due to the technological advancements of the translation and browsing software. Then you have to find relevant sources and compare different relevant sources because there is often significant variances or even discrepancies present. I caught myself few times citing a seemingly credible source and later discovering that it was wrong. You simply must not thrust anyone or anything rather check everything by yourself. Moreover, double and triple check. Of course, this action requires objective analitycal-critical approach not possessed by the majority of people.

What is the solution for all problems? Education and learning.

What is "learning"? Is it pure data infusion following "the more the better" approach? Most people think so because public educational system and popular tv quizzes promote vaste of trivial facts but it isn`t. Learning is a much subtle process which includes searching, comparating, weighting, filtering, accepting, discarding, connecting, contemplating, concluding and, finally, testing or applying.

That is why old Masters said "learning is not just adding but deducting as well" or "you must unlearn what you have learned". I mean, they bombard us in public educational system and mainstream media with theoretical, disconnected and impractical knowledge that we can not use in the everyday life.

One can search for the truth or accept predetermined viewpoint and without any scrutiny which is a neat way to avoid personal intellectual endeavour at the expense of own cognitive demise.

To understand something in its nature you must dive deep, distance yourself, observe the matter from every possible angle, internally and externally, separately and completely.

Dear readers, my friends, I have but one single goal: derivation of the "Grand Unified Theory" or the "Theory of Everything". Some have started, like late Dr. Hawking, and I will continue. Despite the obstructions, false accusations and insults made against me. Despite an underestimation. Despite all odds.

You ask... Who am I to challenge the God(s)?

The God(s)? Or those who claim to speak in their name?

On contrary, I do not claim to speak for God, an absolute Supreme Being. It doesn`t need a spokesman. It has the power! It has the megaphone - the quantum field, the cosmic neural network to directly reshape and reorganize reality as It pleases.

Visual, symbolic signs are not divine messages. They are misunderstood insignificant statistical occurrences. Instead, look into the complexity of

existence. Observe the paths and the crossroads.

In my mind I venture deep into the Truth.

Yet... I do not claim to speak the Truth.

There is no need.

The Truth speaks for Itself.

Just like the Sunlight shines: independent of anyone's assistance.

Gratefully, I have one companion called the scientific method to aid me in my (our) noble quest.

Where we stand today?

We have plausible theories about Universe origin, both scientific and religious, none entirely disputable or indisputable. That is exactly why they are called "plausible theories". My personal view is that there are four (4) equally possible first causes of this Cosmos: 1) God, 2) Nature itself, 3) computer simulation (initialized beyond this reality) and 4) higher specie.

Why God? Because using Occam`s razor principle the simplest explanation is the most convincing and very likely true. But it is actually more an excuse than an explanation because you just moved the question one step further. How did God came to be? It is eternal. It didn`t had to come to be.

How Nature itself? Either by Penrose CCC, my Logical Transition Theory, combination of both or any other reasonable model. It is mind-blowing fact that the Universe could be the perfect pendulum but it just could be swinging

back and forth eternally without beginning and originating from nothing, Ex Nihilo. My concept of nothing includes two logically detectable properties and related values: volume (no-space or infinity) and lack of duration (no time or eternity).

Third and Fourth solution do not give the final answer about the origin. The supercomputer could exist outside of this reality (in hyper spacetime) or it could be invented in a distant future, enabled and, well, here we are thinking that our human civilization is the only intelligent life and even the beginning of it. Although equally plausible, this later two (virtual reality and higher specie) just move us one step in an infinite regress potential I try to avoid.

Hence, there are two origins to discuss: 1) source of this Universe and 2) ultimate source, source of all. Source of this Universe can be either of the four: God, Nature, higher specie or simulation. Ultimate source, source of all can be either of the two: God or Nature.

There is very interesting thing called the "cyclic redundancy check". It is an error-detecting code used in a digital environments for the purpose of discovering and repairing accidental mistakes that occur during the program execution.

https://www.scientificamerican.com/article/are-we-living-in-a-computer-simulation/

Dr. James Gates, theoretical physicist at the University of Maryland, spoke about "an error correcting codes" that he found in his research: "They are present in the equations I was studying about quarks, electrons and supersymmetry". Wow! So, according to the dr. Gates, the Universe is using an error correcting codes to straighten itself when necessary.

In 2003. University of Oxford philosopher Nick Bostrum suggested that

members of an advanced civilization, with sufficient technological background, could have started simulation of the Universe we live in.

Higher specie solution, besides extra-terrestrial or extra-reality beings, includes members of the human race arriving from the future or another place of an origin different than ours in whatever terms we speak (galaxy, Universe, reality).

Higher specie could have planted a life seed. It would neatly explain the Cambrian explosion. But I still think that the Cambrian explosion happened due to the specific change in the Earth`s chemical composition when larger amounts of certain element(s), biologically crucial for life development, became available.

Higher specie may have character of 1) benevolent scientists and explorers or 2) malevolent colonizers and slave traders. This second possibility is exactly why I am enraged with sending messages, like Arecibo and later, in the outer space. It is a notorious stupidity. It could even be that aliens which arrived accidentally on the Earth, accidentally because of the vastness of the spacetime or their contemporary technological inability to precisely choose the place and time of an arrival, sort of random quantum jump, decided to send the message with a sole purpose of informing their headquarters.

I would consider every message sent being an act of treason against the humanity. Or dangerous recklessness. Very weird fact is that known scientists, acclaimed experts like Sagan and Drake, did it back in 1974. to a specific target about 25,000 light-years away. What is there? Messier 13 galaxy (M13) catalogued as NGC 6205. Why did they choose that spot? 50 years later Arecibo telescope, which they used, has suddenly collapsed.

Others like Hawking disagree saying it is hazardous. I have the same opinion.

Hawking said this at the Breakthrough event in 2015.: *"If you look at the history, contact between humans and less intelligent organisms have often been disastrous for the later and encounters between civilizations with advanced versus primitive technologies easily could gone bad for the less advanced... A civilization reading one of our messages could be technologically billions of years ahead of us. If so, they will be vastly more powerful..."*

Nowadays, some scientists want to repeat the message with much more details included. They call it "Beacon in the Galaxy". Don`t you have wiser things to do instead of pointing every potential malevolent entity toward us, the Earth, our home?

Concentrating the sufficient amount of energy into the maximally small area, using strong pinpoint lasers, we can break spacetime continuum apart. With certain risk involved... Complete disaster.

What is the "Grand Unified Theory" or the "Theory of Everything"? It is the search for an absolute Truth, for the cause and an explanation not just of the Origin of the Universe but any reality existing beyond it.

Devising GUT (ToE) is like playing with the ultimate puzzle, putting all the pieces together to discover the final image.

Entire Universe could be just a tiny dot in the overall span.

What if existence is ... Fractal?

Origin of the Universe is not inside but outside of it. Inside are numerous clues which we must properly account in order to decipher the cosmic code.

There is an evident order in the Universe: everything is a logical consequence of the relevant prior factors involved.

There where is an order must be the Law.

If there is the Law... There must be the Lawmaker!

And that Law must have divine reflections in its design revealing us parts of the Creator`s identity.

Do you know how God looks like? It has no form or shape but can take any form or shape as It wills. It is infinite and eternal... However, can It be sure that It is really an ultimate being?

God can create stone too heavy to be thrown which It can throw. Practice makes perfect. God will train and throw the stone when It feels ready. We have satisfied both criteria: "can create stone too heavy to be thrown" and "God can throw it" either by 1) introducing a little physical exercise or 2) accounting for the God`s transcendence by means of quantum mechanics where both situations occur simultaneously - in different temporal zones or entirely new realities.

Do you know what is an infinity? It is a no-space.

Do you know what is an eternity? It is a no-time.

Emptiness is way deep! Send your God(s) and their armies! The limitless void, the eternal darkness is waiting. No borders, no bottom, no beginning. Since... Forever.

Do you know why? Because, the only two things that certainly need no prior cause for their existence are "no-space" and "no-time". This two are the true relics.

No-space needs no cause for its existence.

No-time needs no cause for its existence.

Why would they need a cause to exist since they do not?

But joined (multiplied) they produce spacetime and then the fun starts... What merged them? Pure logic: if no-space (nothing) exists for no-time (eternity) then logically It must went through the phase transition consequently becoming the (initial) singularity which is the first thing that had prior cause(s) of its existence: nothing and eternity. As well, as being the start of the spacetime.

No-space and no-time when together (multiplied) switch into the spacetime. -S multiplied with -T give positive result ST.

Give! Come on!

Thirsty for knowledge, hungry for understanding we walk the path

Few in numbers, courageous and unwavering enthusiasts

Not only passengers on the ship of destiny but also its helmsmen

Developing sails toward new regions of an infinity.

Row, row bravely with your mind through the cliffs and flows,

Through cracks and cuts of the unknown and astonishing

Fascinating, enchanting, intriguing, beautiful.

Don't accept "enough" and "no," always ask for more and more.

Just give, come on,

Build on existing foundations.

And don't stop for nothing.

Because (s)he who stops has never actually moved.

Scientific method

I will start with basic terminology:

Argument is motive for or against subject of discussion. It can be false, quasi or valid. False argument is misrepresented actuality, quasi argument sort of rhetorical sanctuary, valid argument is conclusion based on logical reasoning.

Dialectic is a set of mental skills and procedures which enables an individual, or group leading a discourse, to weight the contradictory views, in any conflict of opinions, by examining the respected arguments both in the favour and against each side in the conflict - equally. Properly learned, dialectic makes you adept to determine the truth despite having prior personal conviction or prejudice that would otherwise limit your mental efforts. The fine, dialectical method of an inquiry acts as an inhibitor of a self-delusion, an eraser of every possible subjectivity in resolving the issue involved.

Axiom is an evident fact.

Theorem is proposition based on axioms.

Empirical evidence is matter obtained during the course of scientific inquiry.

Experiment is the scientific technique used for testing or demonstrating.

Scientific fact is experimentally confirmed and verified statement.

Scientific method is the mandatory procedure for performing scientific tasks. It has multiple stages: observation, inquiry, formulation of hypothesis, experiment, analysis, conclusion, verification.

Universal or particular, truth is a statement which can not be disputed by any rational means. When such statement is repeatedly affirmatively tested using scientific method it becomes accepted as the scientific truth.

* * * * *

Next I will describe three levels of recognition an idea can have in academic community:

1) Hypothesis is an explanation formed with respect to available evidence.

Thesis is a claim proposed in dissertation or other scientific paper.

2) Using proper experimental methodology, both hypothesis and thesis must be adequately substantiated in order to become scientific theory. Although

highly probable, scientific theory isn`t necessarily true.

3) Scientific law is unchanging standard which once established always stays valid under the same conditions.

* * * * *

With foundation laid, I can answer the question "what is the purpose of science" and acknowledge main contributors in development of scientific method.

The purpose of science is to build thorough and precise understanding of a natural phenomenons observed around us which is possible only with the scientific method applied.

Historically, western science began with ancient Greeks, Aristotle and Plato, but enlightment period introduced two main systematic divisions in epistemology (philosophy of knowledge) being empiricism and rationalism. Empiricism (Francis Bacon, John Locke, David Hume) advocates sensory experience while rationalism (Rene Descartes, Gottfried Wilhelm Leibniz, Baruch Spinoza) emphasizes innate cognition and reason as primary inputs for learning. Synthesized by Immanuel Kant, knowledge starts with sensory experience but is interpreted and organized using mind. Thus both are essential for learning.

Observational and experimental approach was heavily promoted by Galileo Galilei, Robert Boyle and Isaac Newton.

In 20th century, one name is definitely highlighted: Karl Popper. Considered to be the greatest philosopher of science, Karl Popper proposed falsifiability as scientific method. Instead of proving, we should aim to disprove

hypothesis and theories.

Although lacking revolutionary ideas, modern times emanated innovations like interdisciplinary research, integration of advanced technologies (computers and AI), open and citizen science, ethical perspective.

* * * * *

Best recommendations I can give to future scientists are:

a) Let an evidence lead you toward the conclusion not the other way around.

b) Avoid rooms with low ceiling and absence of fresh air. Mountaintops offer much better view, you can stand upright and breath freely.

Solving infinity

Opposites emerge from each other: 0 = -1 +1 and +1 -1 = 0.

What do we get when we divide any rational number with zero (0)? We get an infinity (∞). My Windows calculator (standard mathematics) says "Cannot divide by zero" which is illogical.

What do we get when we divide any rational number with an infinity (∞)? We get zero (0). My Windows calculator (standard mathematics) doesn` even offer calculations using an infinity. How silly.

Here is an explanation:

Let us consider a simple equation were Z equals X divided by Y.

Z = X / Y.

Let us try different values for Y while we keep X at 1 for the sole purpose of simplifying because the same principle applies for any X rational value. Zero (0) and an infinity cases will be discussed subsequently.

First situation: X =1, Y = 1 or dividing 1 with 1. We get 1 as well.

Z = 1 / 1 = 1.

Ok?

Now change the Y value into one half or 1/2 (0.5). In other words, decrease the Y value.

Z = 1 / 0.5 = 2.

Z value has increased.

Let us see what happens if we increase the Y value.

If Y = 2 then Z = 1 / 2 = 0.5

Z value has decreased.

By decreasing the Y value we increased the Z value. By increasing the Y value we decreased the Z value. Obviously, Z and Y values are inversely proportional. The more we decrease or increase one of them the second will equivalently increase or decrease (do exactly opposite).

Good?

Let us gradually decrease the Y value using exponential change to accelerate the process: Y = 0.1, Y = 0.01, Y = 0.001, Y = 0.0001 and so on...

Now we have this:

Z = 1 / 0.1 = 10.

Z = 1 / 0.01 = 100.

Z = 1 / 0.001 = 1000.

Z = 1 / 0.0001 = 10000.

Etc.

The more we decrease the value of Y equivalently we increase the value of Z.

Right?

Finally, if we divide with zero (0) we will get an infinite value for Z.

$Z = 1 / 0 = \infty$

Isn`t that logical?

Let us increase the Y value.

Y = 10, Y = 100, Y = 1000, Y = 10000 and so on.

In this scenario the value of Z will equivalently decrease!

$Z = 1 / 10 = 0.1$

$Z = 1 / 100 = 0.01$

$Z = 1 / 1000 = 0.001$

$Z = 1 / 10000 = 0.0001$

Etc.

Finally, if we divide with an infinity (∞) we get zero (0) result for Z.

$Z = 1 / \infty = 0.$

In the case of the black hole singularity who knows what this revelation implies? It is beyond rational understanding.

What if we take zero (0) or an infinite value (∞) for X. Now things could become tricky... Or not? Let`s see...

We have this two possible situations:

$Z = 0 / Y$ and $Z = \infty / Y$.

In case $X = 0$ for any Y rational value the result will be, in pure mathematical terms, also zero (0) because nothing (0) divided with any rational number gives nothing (0) in return. For example, you divide the zero (0) into one hundred pieces. You get one hundred pieces of the zero (0).

$Z = 0 / Y = 0$.

Note that we are talking in a pure mathematical terms were nothing really means zero (0). My concept of the primordial nothing is a different thing.

In case $X = \infty$ we have:

$Z = \infty / Y = \infty$.

If we divide an infinity with any rational number we get an infinity (∞) result back meaning every piece of an infinity is also infinite. For example, you divide an infinity into one hundred equal pieces. You get one hundred pieces of an infinite value each. Otherwise, if any piece is finite then the division wasn`t perfect. Meaning you didn`t divide into one hundred equal pieces. If all pieces are finite then put back together you will not return to starting infinity.

Mathematical conundrum demistified

Mathematicians and physicists have long sought an answer how to calculate with the infinite value(s) depicted by the symbol "horizontal eight" or ∞.

I watched documentary A Trip to Infinity (2022.) and decided to fathom certain misconcepts present in it.

At the start of this documentary, version of the Hilbert's paradox of the Grand Hotel is explained. Basically, the problem is paradox by itself: imagine a hotel with an infinite number of rooms which can accomodate an infinite number of guests but the subsequent conclusion is that there is no infinity. If there is no infinity then how can you imagine it in a first place? I offer counter-example: imagine an elephant which does not look like one. Voila! We have proven that elephants do not exist as such. Silly, just like Hilbert's paradox. There is no sense at all. They say, imagine "countably infinite number of rooms, all of which are occupied". Countably infinite? What are you talking about? Infinity which can be occupied? Hello? Reality check please.

Next, certain mathematicians state as follows:

1) If you divide one with 2, 4, 8, 16, etc. to the infinity and then sum it all you will get one. 1/2 + 1/4 + 1/8 + 1/16 +... = 1. Meaning, infinity equals one. No! Only the specific subsection of the infinity equals one while infinity has infinite number of subsections.

2) If you add one to infinity it still equals infinity, right?

$1 + \infty = \infty$

If we subtract infinity on both sides we get 1 = 0.

Meaning, 1 equals 0.

Therefore, an infinity is absurd.

No! If you can add 1 then you didn`t have infinity to start with. You can not add any amount to the infinity. You can only add to the infinity minus X, in our case 1. Then 1 and -1 mutually neutralize giving result of infinity equaling infinity.

$1 + \infty - 1 = \infty$

$\infty = \infty$

Otherwise, the result is an infinity plus one. If you deduct infinity on both sides then you get one equals one or if you deduct one on both sides you get infinity equals infinity meaning an infinity concept is not absurd.

$1 + \infty = \infty + 1$

$1 = 1$

$\infty = \infty$

3) If you add an infinity to an infinity the result is an infinity. By subtracting infinity on both sides you get infinity equals zero.

$\infty + \infty = \infty$

$\infty = 0$

No!!!!! What a horse... radish.

If you add an infinity to an infinity the result is also an infinity plus an infinity. Or, abbreviated, 2x (two times) an infinity. If you deduct an infinity on both sides then you get infinity equals infinity or if you deduct both infinities on each side you get zero equals zero.

$\infty + \infty = \infty + \infty = 2x\ \infty$

$\infty = \infty$

$0 = 0$

4) If we take a triangle and gradually add corners we get more sides with smoother line curvature straightening the circumference. Eventually, we get a perfect circle without any (visible) angle. Meaning, infinity (infinite angles) equals zero (no angles).

Maybe, you will never truly straighten the circle. You will just make it appear more round. Infinity is a never reached potential.

Draw a triangle. It has 3 corners (angles).

Draw a second triangle opposite to the first, partially overlaying. Now we have 6 corners.

Draw a third triangle with different positioning than first two, partially overlaying. Now we have 9 corners.

Repeat the sequence indefinitely: either in the same manner, by adding 3, or exponentially ("+ 6", "+ 9" or "+ 12") to speed up the process, until you get a perfect circle.

0 + 3, 3 + 3, 6 + 3, 9 + 3, 12 + 3, 15 + 3, 18 + 3, 21 + 3, 24 + 3,... n + 3... ∞

In the documentary, they suggest how an infinite number of angles in a perfect circle equals zero angles. They practically postulate that infinity equals nothing.

Following the mirror logic, if x equals y then it is vice versa as well: y equals x. Meaning, zero angles equals an infinite number of angles or nothing equals an infinity.

No. Their postulate is wrong.

Perfect circle has an infinite number of corners (angles). Not zero.

How many corners does a simple dot have? Zero (0). None.

How many corners does a simple line have? Zero (0).

How many corners does letter "V" have? One (1).

How many corners does letter "X" have? Two (2).

How many corners does a triangle have? Three (3).

According to their logic, a simple dot and a single line by having no corners (0) actually have an infinite number of corners (∞).

Implication is that a perfect circle and a simple dot both have an infinite number of angles and zero angles at the same time.

The only thing that seems paradoxical is their thinking. Unless indeed, an end means a new beginning. If you reach an infinity, which is impossible, then you arrive at the start. Perfect circle becomes a simple dot again. Remember that when you start drawing a circle you begin with a simple dot.

Truth be said, you will never absolutely straighten the circle. You will just make it appear more round. Infinity is never reached potential.

What do they claim? They claim that an infinity can be reached. How can an infinity be reached, even hypothetically, when the very term means what is "intangible, elusive, unreachable".

Imagine something that is infinite (intangible, elusive, unreachable) but also imagine that we can seize it. It is paradox in the premise. If there is a paradox in the premise than the conclusion must be wrong.

Tell me, wise documentary heads, how will you reach infinity by adding angles to an object, even hypothetically? Because if you do then it wasn`t an

infinity to start with. This also applies for the Hilbert's paradox of the Grand Hotel.

5) If we take small and big circle, for example having radius one cm and billion cm respectively, we can draw lines connecting each dot on both circles matching every radius with its longer counterpart?

They are suggesting that circumference of the smaller and bigger circle is the same. Nonsense.

What is a circumference? It is a linear perimeter around the center of the circle in which every dot of the perimeter connected with the middle point has an equal lenght.

$c = 2 \times \pi \times r$

c - circumference

pi - constant

r - radius

Small circle has small radius, big circle has big radius. Circumference is dependent, proportional meaning you can not connect each dot of the small and big circle mutually. On big circle you will have empty space in-between the lines.

6) If you sum 1+2+3+... + n and you divide 1 into the decimals it seems that segment, continuously fractioned ad infinitum, is an infinity in an infinity.

No. You can divide only to the Planck size. Hypothetically, if we divide further

we still have one (1) as predetermined quantity. It does not mean one equals infinity. It means it can divide infinitely.

Let us find examples of an infinity in the real life.

There are abstract infinities like one split into a three perfectly equal parts. It is impossible since 1 / 3 = 0.33333 with "three`s" to infinity...

I tried using an online calculator.

1 : 3 (or 1 / 3) = 0.333333333333

But!!!

Reversely,

0.333333333333 x 3 (multiplied with 3) = 0.999999999999

Not 1.

The digit 3, decimal three, continues ad infinitum.

Another example of abstract infinity is constant Pi (π) which depicts the ratio of a circle's circumference to its diameter, approximately equal to 3.14.

Basic formula: π = c / d

π - constant Pi

c - circumference

d - diameter

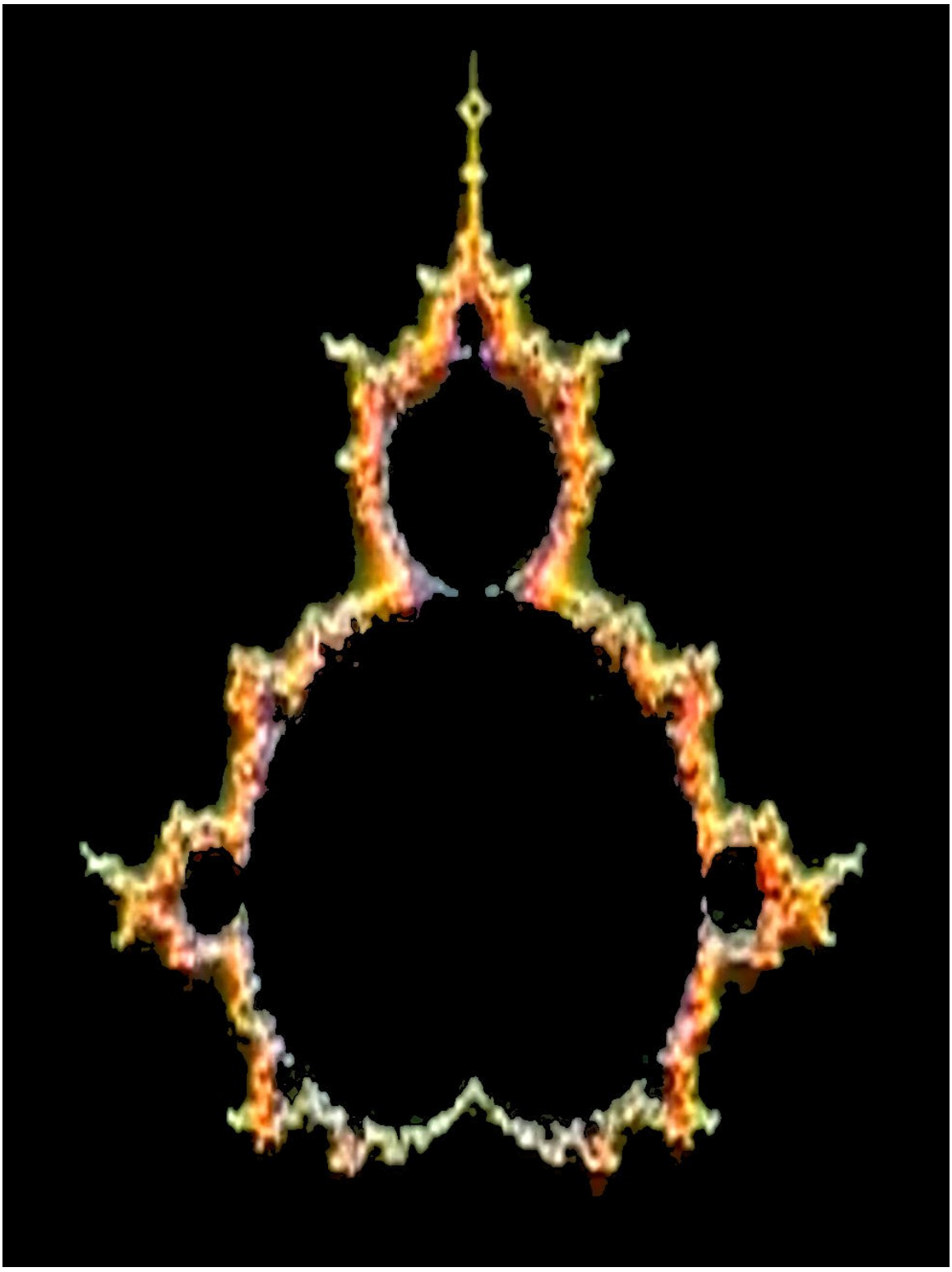
Although, there are much more subtle ways for calculating Pi like using Machin's Formulas, Gregory and Leibniz account, Riemann zeta function, Newton`s calculus or Ramanujan generator which are all actually an algorithms for extraction of the Pi digits.

Numbers like Pi, Euler's e, the Golden ratio φ or all square roots of natural numbers other than perfert squares are called an irrational numbers meaning they can`t be expressed as a ratio of the two integers.

Record for saying the most digits of Pi is held by the Suresh Kumar Sharma, from India, who spoked Pi to 70.030 decimals in the year 2015. Some computer programs have calculated the value of Pi to the precision of almost 63 trillion digits.

Great example of an abstract infinity is the Mandelbrot set or fractal curvature producing more and more complex numbers in both directions. There is a great documentary titled "The Colours of Infinity" (1995.) made by famous Arthur C. Clarke in which Stephen Hawking and Benoît B. Mandelbrot explain the beauty of the Mandelbrot set where iteration of the function C (Z) = Z2 + C creates new, similar shapes over and over again, two-ways without an end.

Mandelbrot set



Mobius band is an excellent example of the real infinity. It proves my thesis how an undefined equals an infinite.

You can go as much as you want in any of the two straight directions and you will never reach the end because pathway continues add on. It even looks like symbol for an infinity.

Does Mobius lane exist in real world? Yes, says Einstein. It is closed Universe in which we return to the starting position after traveling for long period of time. Talking about spooky?

In a documentary "Is God a Number?" (1999.) Roger Penrose, Nobel winning mathematician, distinguishes three layers of the reality: mathematical, physical and mental.

Second real infinity is related to the mental sphere.

In a documentary "Bufo Alvarius" dr. Stanislav Grof, Czech psychiatrist living in the USA and one of the founders of the transpersonal (spiritual) psychology, reveals actual experiences induced by 5-MeO-DMT, the strongest known natural psychedelic produced in the glands of the Sonoran Desert toad. Student of a Freudian psychoanalysis, his early professional work explored usage of the LSD in the psychedelic therapy and its effects on the human psyche but also researched Otto Rosenfeld`s ideas.

Dr. Grof separates two modes of consciousness: hylotropic ("name and form" or personal lower self) related to an everyday awareness of yourself and holotropic (Hindu concept of Atman-Brahman) experienced during meditation, mystic seances or under influence of the psychedelics.

I will cite what has one test subject answered when being asked about his latest, scientific, "involvement" with the Dimethyltryptamine: "You just can not prepare for that... You experience truth, the essence, an entire Universe... You experience the moment which lasts forever". Second test subject said: "I

was light that became everything, an absolute unity of all things, an infinity".

Compare Mandelbrot set with common depictions of Atman-Brahman (meditating person) and you will find striking similarity between two.

Is God a number? If yes, it is very special, complex number or the set of very special, complex numbers stretching fractally to an infinity and transcending beyond the conceivable.

This view is not all original because Gottfried Wilhelm Leibniz, Enlightenment period German mathematician and philosopher, already some 300 years ago proposed that a conscious mental activity takes place on the higher levels of an awareness.

Origin thoughts

Universe is either infinite or not but in either case nothing is infinite. If Universe is infinite then nothing which place Universe now occupies was also infinite. If Universe is not infinite then considering its immense size what surrounds it probably is. We know that Universe is expanding and even faster than previously thought. Expansion means that Universe is not infinite but tending to be. Again, considering its immense size what surrounds it probably is infinite.

When I say nothing was prior to Universe and outside of it I do not exclude phenomenons. What I refer to as nothing could actually just be unobservable for us. In cosmic terms, we see inside visible spectrum while we need special equipment for the rest. How could we see before, outside and beyond Universe when we still struggle at lower level?

Nothing from which or in which Universe came to be could be imperceptible

medium, but not undetectable, hyperreality where dimensions meet and intercept.

Hyperreality is the source of singularities (cosmic seeds) and it connects all Universes into Multiverse. This idea is not related to Baudrillard‘s sociological concept where hyperreality means reality replacement. I am talking about root layer of existence while Baudrillard is talking about false images which distort perception of reality.

Moreover, I believe there are parallel realities each housing its own Multiverse.

Whoever the Creator is why would It stop at one? Like any artist, opus is numerous with various pieces collected into different sets belonging to distinct creative phases. Finally, when the master set is completed God starts totally new work.

Who is Creator? God is an easiest answer but not God poorly imagined by many religions as human like being sitting on a throne above clouds (although It make take any form It chooses) because this depiction implies simplicity, subjectivity and locality. On contrary, God is elaborate, transcended and omnipresent starting as not manifested quintessence, great spirit, supreme incorporeal entity. At some point It become bored with endless emptiness and decided to create things. I already become puzzled at what point because for God there is no time: It is eternal, It makes everything instantly, It is never late and doesn`t get old. Truly fascinating characteristics yet this idea requires prior consciousness. Second possibility is Nature: there is no starting point and no prior consciousness instead everything evolved by itself, intrinsically from... Nothing. Even consciousness itself.

Before Universe was created there was no time and there was nothing. These circumstances do not require any prior cause to exist nor they have an end. No time is not same as zero time. Zero time is beginning of time (0 s). No

time is opposite of time which is finite therefore no time is opposite of finite meaning it is unlimited. What is unlimited amount of time? Eternity. God had an eternity to contemplate and plan creation, expressed as singularity, while execution (inflation) lasted less than a second. Time and space are derived from eternity and infinity, borrowing value in order to return it without interest. Return to... an endless, abstract, interwoven fields.

Primordial black holes generated inward pressure countered by reverse action of aetherlike substance (dark energy) radiation and expansion of the Universe. Before that, in plasma state there was no pressure and heavier elements couldn`t be formed.

Eternity is now.

Metaphysical paradox is that eternity equals present moment, never passing everlasting jiffy switching to an illusion of the flow achieved by constant energy transformation.

God as transcended supreme entity does not depend on any physical law nor can be expressed by any quantity or visually described. It is beyond any measurement and practically impossible to understand. No one will ever realize It`s complete magnificence - not even close. What is possible to grasp are only material, observable and detectable manifestations such as our Universe if it was created by God. My best guess is that our Universe was created by higher, very intelligent specie by planting self-unpacking cosmic program code into the cracks of existence known as voids.

How could God supervise all aspects of creation? Does God receive every prayer made by living beings? By having multiple instances each responsible for particular segment. While master instance works on new designs, lower instances are maintaining the system according to higher instructions. Communications between instances are immediate without any delay (quantum entanglement is the proof). Master instance is not bothered with trivial things such as human prayer "can I get a new bike"? Same as in any

organisation but with one significant difference - all instances are One. Meaning, there is no hierarchy. Without hierarchy there is no competition because all parts are equal yet having different function. Although not directly involved in supervision of all aspects, nothing can be hidden from master instance. It is aware of everything, everytime, always.

Often, I tried to contact Demiurge in my thoughts. After discarding all irrelevant content, two messages received on separate occasions sound like having divine origin: 1) I am in the state of perfect balance. 2) You have started to think. In first message, God asked about its name presents Itself as perfectly harmonious. Second message is intended for me who have just started to think. There is a long way to go before you understand - God replies or I just project my own thoughts.

Usually, meditators go into solitude, high up in the mountain, underground or deep in the forest to isolate their senses and concentrate. There is too much disturbing signals like radio and tv broadcast. I did it in my home before sleep because I expected silence then. It was significantly quieter compared to daytime but far from silent. Even without mosquitoes buzzing, typical household and street sounds and with technology switched off there was still low background noise. Anyway, this two messages were recognizable and consistent with questions I asked.

During meditation, how can we distinct what is divine message and what are ideas emerging from our mind? First, answer is directly related to question posed. Second, answer is meaningful and revealing. We must discover something previously unknown. Yet, technologically inferior, we can not discern magical from scientifically advanced. We are too easily fooled.

If I can talk to God my questions would be metaphysical and scientific: how many Universes exist? What is the nature of reality? How did you create this Universe? Some are practical like what is Time and can we travel through it? Is there universal medicine for every disease? I am not interested in my personal life. That is trivial compared to forementioned.

Regarding Time, it is a human made concept. Energy constantly transforms and entropy changes creating illusion of the flow. You need energy to measure Time. Actually, you just calibrate. Hence, Time is an energy. To be precise, transformation of energy. What we call now, this moment is current entropy status immediately flying away.

Another illusion could be an overall existence. Maybe all is divine projection. We think we are because God made us to believe that we are. How? With suffering. Pain reminds us that we are mortal. Remove pain and you become free from earthly shackles.

Everything that lives must die. Decay is imminent, oblivion unavoidable. But don`t be scared of death... Once when you are gone you will not feel anymore, you will just seize to be and return energy that you selflishly borrowed. Unless you are caught in a time loop. Then your agony will repeat indefinitely.

To preserve the balance, once created Universe eventually must be destroyed. Death begins with birth. Living means rotting. Living means rescheduling your fate. Eat fresh apple and you will get another day for yourself under cost of defecation, negative energy discharge causing environmental disaster. Oh, we have built sewage, cleverly transporting our waste down the stream and into an open seas. Polluting, we are messengers of apocalypse. Four horsemen of terror are Cytosine, Adenine, Guanine and Thymine. Thus, act of creation is conditional, existence countered with destruction: everything from nothing and back.

Surely, God haven`t envisioned every detail cause they are infinite. Even God would have trouble with such annoyance. It crafted singularity, tossed it into the void and Universe is what we got. When you break glass cup can you know how will each broken piece look like? Do you need to know it in order to make glass cup in first place? Events unfolded, particles combined, life emerged from still water and wet soil because other mediums (moving

water, dry land, air, wood, rock, sand) are inadequate, turbulent or inaccessible.

Everything is a logical consequence of all prior relevant factors involved. Give me enough data and I will tell you the future or reveal past states of the system by merely knowing current entropy status.

Is future spontanious or decided? Do we really shape our own destiny or we just follow predetermined footsteps? When you throw a ball in particular direction that ball has no choice but to follow the chosen trajectory. When it hits an obstacle it will pass on kinetic energy. There are no deviations whatsoever. Is there a freewill? Can ball decide not to hit an obstacle or not to pass kinetic energy?

All things share properties belonging to what is upper in the chain. All things in Universe share properties belonging to initial singularity which share properties with its maker. Whatever you do carries your own signature. You can not have offsprings that don`t look like you because you passed your DNA to them. Otherwise, they are adopted children.

You can counterfeit but then the quality of forgery reveals who you are.

If God knew what will happen it means he knew about all the suffering that will occur. Wars, hunger, sickness, crimes, pain, agony, death. Entire ecosystems are destroyed. If it knew then It is cruel and sadistic. Excuse comes in the form of reincarnation. Those who suffered shall be rewarded after death; those who caused suffering shall be punished (karma). But that law would be universally known and accepted. It is not. Every culture has different religion. Some cultures don`t have religion, some enjoy blood rituals. Who can rely on anything in such chaos? Maybe one day all world will recognize reincarnation as real. In such case, I apologize for calling God cruel and sadistic. Hence, suffering is huge obstacle which points me in other direction. There is no God. Then who or what created everything? Does things exist without being created? Did they produced themselves? How

could that be possible? Indeed, God idea sounds easy and true but the mental challenge lies in finding other plausible solutions like nature evolving from nothing or eternal pendulum swinging back and forth without beginning.

Everyone can say God. I hear uneducated, semi-literate individuals yelling God is Creator. Explain, give reasonable grounds for your belief. Don`t repeat what you have heard in your religion class. Otherwise I am looking for new interlocutor.

Aside what people believe, God "is" or "is not". Later should be taken conditionally because for us humans, with our current scientific insight, quantum (subatomic) domain remains a mistery as well as spiritual (energy) realm. What I say "is not" should be considered more like transcendent or hidden from our sight. Literally, "is not" does sound utopian. Maybe God is in both states simultaneously? But how can God of such dual, binary nature return from the state of no being? There must be a safe switch beyond highest consciousness. Meaning, even if It "is not" It still "is" which is illogical. Thus specific approach remains. It is either existing or not existing, not 1 and 0 at the same time. Is there a third possibility? Aren't singularity and void just like being and not being interwoven in the spiral of existence?

If God "is" there are three possibilities for creation: ex nihilo by divine act, primordial material existed prior to manufacturing or everything is God`s projection of reality.

Or Universe could have started naturally. From nothing.

What would God, as supreme architect, create first? Fields (frame) because one can not work in chaotic state. You must have the reference points to determine quantities. Therefore, ratios have fundamental origin. In God's mind he sees dimensions not their values because for God values are automatically derived from the geometry. Best said, God knows the numbers by simple observation. It doesn't need to translate actuality numerical as we

humans must in order to compare and calculate.

If mathematics is an utmost fundamental building block of nature, with binary base and encoded on Basic Input/Output System read-only memory chip, inflation could have been exponential field growth determined by function 2 to the power "n, n+1 where n=0" (1, 2, 4, 8, 16, 32, 64, 128, 256, etc.). Same as data is visualised on a computer or tv screen, this reality can be holographic simulation having outside origin.

There is an argument how this Universe is too vaste to be produced by any contemporary computer. Who is talking about contemporary? I am saying that in future people will have much stronger machines than today as well as more developed programming code. Prospects of quantum engineering and artificial intelligence are already seen yet questions of ethical character remain unsolved. Are human brains going to be replaced with electronic chipset? Also, observe that we, each of us individually, only process part of the reality by ourself, only our immediate surrounding while background is pretty obscure. Besides, 3d virtual reality equipment already creates rather convincing surrounding.

Everything must have its counterpart, the negation of itself that completes the whole picture. If you exclude "nothing" then you have nothing to compare everything with. If you do not know what is nothing how can you know what is anything? If there is no darkness then what is a light? If there is no ugly how can you appreciate the beautiful? If you haven`t seen the black clouds above your head how can you admire a sunny weather? Opposites draw on each other. If there is a God there is also a not God. What you refer to as the Deity is one aspect of the quintessence with other being the Devil. What is between plus one, Yang, Vishnu, Asha, and minus one, Yin, Shiva, Druj? The quintessence of the all. The all there is, manifested, hidden or transcended.

Logic Transition Theory

Everything in the Universe is a logical consequence of the previous relevant factors involved. If we extrapolate all events backwards, using computer simulation or mathematical calculation, galaxies would get closer and closer, matter would compress more and more until entire spacetime clinch into the initial singularity of infinite density and energy. Let us extrapolate one further step: what are the rational premises for the initial singularity?

Two phenomenons that reside solely in the domain of the metaphysics: Nothing and No-Time. Their nature is transcendent, preoriginating creation of the Universe, therefore it is not perspective subject contemplative from the physical standpoint. Nothing and No-Time need no prior causes for existence. What is nothing? Nothing is real. Remember intergalactic vacuum? What is 99.9% of its cubic meter? Nothing. What is time? Time is measure of the Earth`s angular momentum. We have divided Earth`s rotation cycle into the 24 hours and produced time scale. We use movement of our planet to describe time. Nowadays, we use atomic clocks. But before the Big Bang there was no Earth, no planet, no matter, no space, no atoms. We have nothing to compare time with. Nothing to use as a calibrator.

Does that mean that there is no Time? No. It means that we have nothing to measure time against. There is nothing and nothing is happening. Time is factor of the velocity. No velocity = no time. No time equals eternity. Imagine you have a stopwatch with no units noted. How long will you wait until any amount of time passes, even infinitesimally small? Infinity because there is no time to pass. Only when Time started to be realised, at the moment of initial singularity when first event in the Universe happened. Nothing has existed for an eternity and it jumped into the next logical phase: 0 became 1 or, better yet, +1 and -1. We know when it was from now but if we look from the initial singularity moment into the past we can not see the beginning. How can we see anything which has no beginning? It is like looking into the sky - can you see the edge of the Universe? Take best telescopes - do you see the edge of the Universe? Even if you do - that edge is not an edge when you look again due to the expansion of the spacetime. Think of it as the Heisenberg principle on the macroscale: you can not measure exact position and velocity of the cosmic border at the same moment.

Nothing is deep. Nothing is eternal. You can not see its bottom - you can not see how old it is. Hence, it is eternal in the past direction. We can place initial singularity 13.8 billions years ago observing from now. Observing retrospectively from back then we can not place it anywhere or anytime because we have no previous reference. Nothing was nowhere and never. Being nowhere and never actually it was everywhere and eternal. It is a paradox. That is why I say it is solely the domain of metaphysics: "Unseen roots of no prior cause". On the vector of eternity the moment of initial singularity is undefinable and irrelevant. You can not precisely determine the infinity and eternity. We use symbol "8", in horizontal alignment, to express such quantity. And minus sign in this case.

Hence, Universe needs no creator. Universe could exist by mere logic of phase transition from 0, which lasted for an eternity, to 1 immediatelly splitting into the two opposite particles of matter and anti-matter.

What is nothing?

What are the characterics of nothing? We certainly can not come to the nothing from somewhere simply because there is no somewhere - there is only nothing. Nothing has no matter, no forces. Try to close your eyes hard so that no light enters them, cover your ears tight so that no sound passes, exhale and stop breathing for a moment, forget about your body and relax, stop thinking. That is what nothing looks like. Exactly: nothing. But Nothing has potential. Nothing has ability to make something appear. Particles and antiparticles emerge, annihilate between pair and disappear.

We ask ourselves the wrong questions because we act accordingly to the 2nd thermodinamic law of entropy. In order to find solution we must reverse our thinking. We must reversely engineer the Universe. Same as "how" Universe began instead of "when" it began, we always ask "can something come out of nothing" instead "can nothing come out of something". Yes it can. Particles and antiparticles cancel each other - something creates nothing. Isn't the backward method logical? If I enter the room then I can certainly get out the same way. If something goes off then it can go on as well. 1 and -1 summed

equals 0. Isn't it logical that 0 equals summ of 1 and -1?

As well as there is only three possibilities for Time to exist: 1) it was forever, 2) it started at some point or 3) it is an illusion, Universe could have: 1) existed forever, 2) started at some point or 3) it is an illusion. We live beings feel the Universe is because we are entirely susceptable to its laws. One can not discard his or her feelings. But in order to think like God - we must transcend our thoughts beyond borders of the spacetime and contemplate in the astral sense.

There are only 3 possibilities for Time to exist: first, it existed forever. This sounds interesting, even logical.

Second, it started at some point. But in what point?

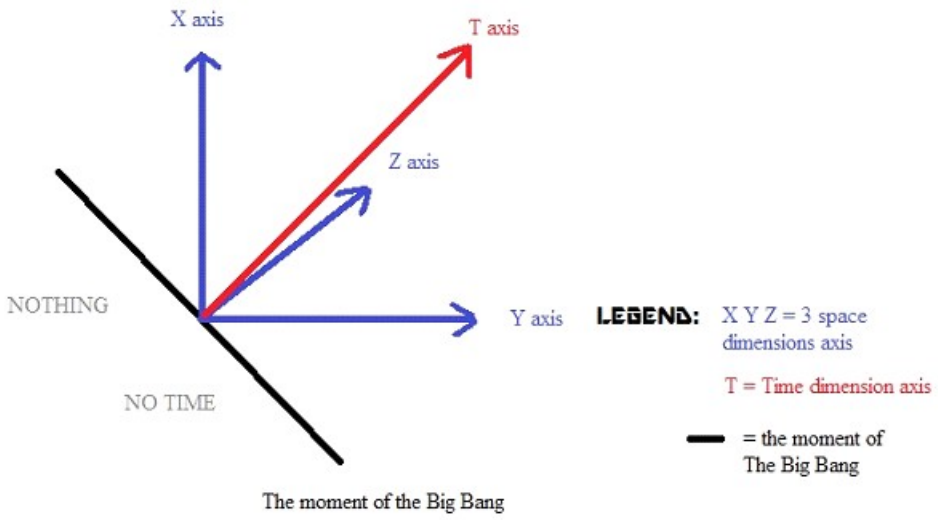
Third, Time does not exist. It is simply man made concept to measure duration of events. Event can be either motion or transformation (including decay, improvement, change) or any combination. Event is not strictly physical. It has duration property. It started at some moment in no-time which can be whenever or never, the first quantum fluctuation in the Universe: 1 or 0, and it will end sometime or it will last to eternity. I recognize periods which are interwoven and create an active fiber of the Time illusion phenomenon that do not really -is- but rather -is virtual-. For example, computer representation do not exist. It is virtual. There are only physical energies or masses and forces that govern them. Accordingly, there is no true reality. There is only visual reality.

Second possibility seems just like the hot Big Bang Friedmann model of the initial Cosmos. At some moment in the higher Time dimension smaller fragment branched. Same problem arise: when did this higher Time dimension began? Identical situation occurs again and again if we try to offer same solution. We keep extending the circle of the subject. In order to answer the question it is obligatory to observe the question from outside. You do not know for sure how you look without enough light and a mirror to

reflect your image.

NO-NO paradox:

NO-NO paradox:



If Universe (including Time) started at a certain point, which scientist call Big Bang, what existed before that? Lack of anything material, absence of everything, nothing is easy to grasp. It is easier to ask ourself and contemplate how and when Time alone started to exist rather than how and when space and time together started to exist in the form of the Universe. On the other hand it is much easier to understand lack of space than lack of time due to the visual representation of the matter in contrast to the invisible nature of the Time. I can imagine nothing spatial existing before Big Bang but I can not imagine nothing temporal existing before Time. That is a paradox any way we look at it: if any amount of Time existed before Big Bang then we can not say that Time started with the Big Bang. But if Time started to exist with the Big Bang then nothing – lasted no time prior? Nothing is so unstable that it lasted for no-time? I have a parallel: when I try to rest my

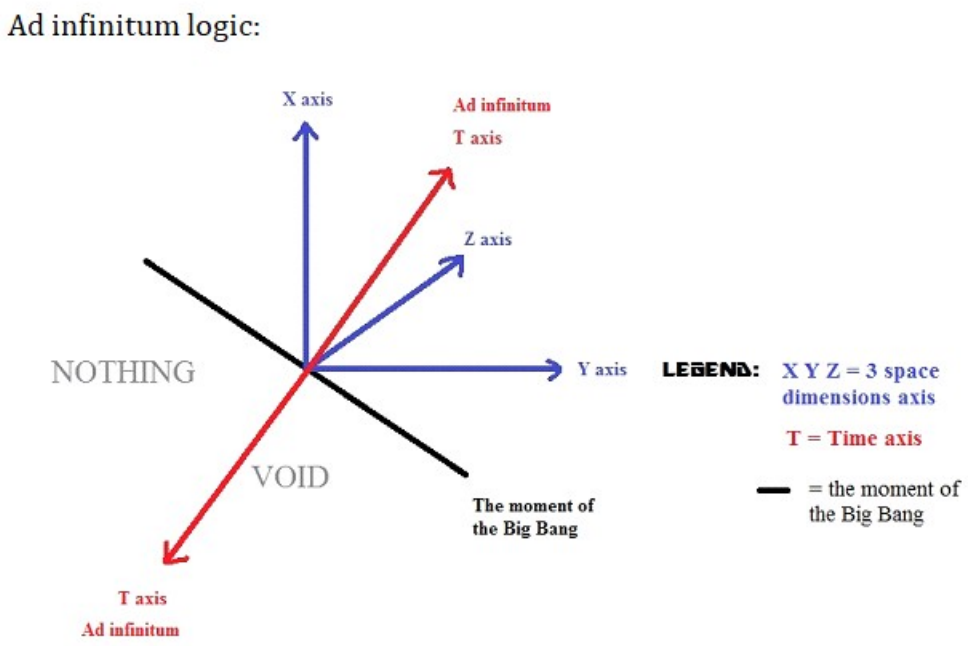
mind while being awake I can hardly suppress thoughts and sustain the phase of not thinking for a longer than few minutes – sooner or later my concentration falls and some thought manages to squeeze out of my neurons and manifest itself... We have nothing spatial which lasted for no-time and then was the Big Bang? Nothing simply wants to become something as faster as it can and now is the best time to do it? Nothing was nothing for no time and then it decided to explode and expand? I have trouble accepting the idea that Time started to exist with the Big Bang. It has no logic – it is a paradox any way around: if any amount of Time existed before then Time didn`t start with the Big Bang. If Time started with the Big Bang then nothing existed for no-time prior? It is Universe or nothing!? This „at the point“ concept is hard for me to appreciate without the instability factor accompanying zilch. Do I see primordial quantum state here: first 0/1 occurence ever? 0 is so unstable that it was 0 for 0 time and immediatelly turned into 1 and expanded further? It actually proposes that quantum instability is fundamental principal of the Nature. Quantum instability or... (inter)change. I must notice similarity with the Yin-Yang philosophy or dual nature of the Universe: Yin turning into Yang and vice versa; 0 and 1 alternating repeatedly. Does it mean that one day 1 will become 0 again? Maybe when it stretches to a maximal degree, maybe not. Maybe only 0 has instability factor included. Maybe 1 is firm. However, „at the point“ theory indicates that Universe, spacetime, started - what a selfish idea.

Humans first claimed that everything rotates around them (Earth). Then they said that everything started with them (the Big Bang). Why should everything started with the Big Bang? Big Bang could have been just one event in the everlasting continuum. I imagine reality before the Big Bang but not our kind of reality, instead hypertime and hyperspace forming hyperreality – time, space and reality without boundaries and limits. I imagine massive Sun, bigger than our galaxy, gigantic black holes and I imagine huge dark energy area creating cosmic thunders – electrical discharges that occasionally hit surrounding emptiness causing big bang to occur on the opposite side of conditional nothing or in the parallel reality. In that case, quantum state is fundamental but only as a consequnce of the randomness of the cosmical electrical discharges, not as a self-induced or field-induced alternation. While conditionality of nothing arises from the fact that there are forces prior to the Big Bang. Being in the box (Universe) we simply can not see what existed before the moment of the Creation but we selfishly consider it to be the start and the end – and, moreover, having the

meaning and the purpose. We should accept the possibility that our Universe is only a consequence of the higher cosmic inccident. Perhapse there are layers of reality.

The most interesting question is: if there was nothing and no-time before the Big Bang then exactly where and when could that Big Bang happened? This is paradox by itself.

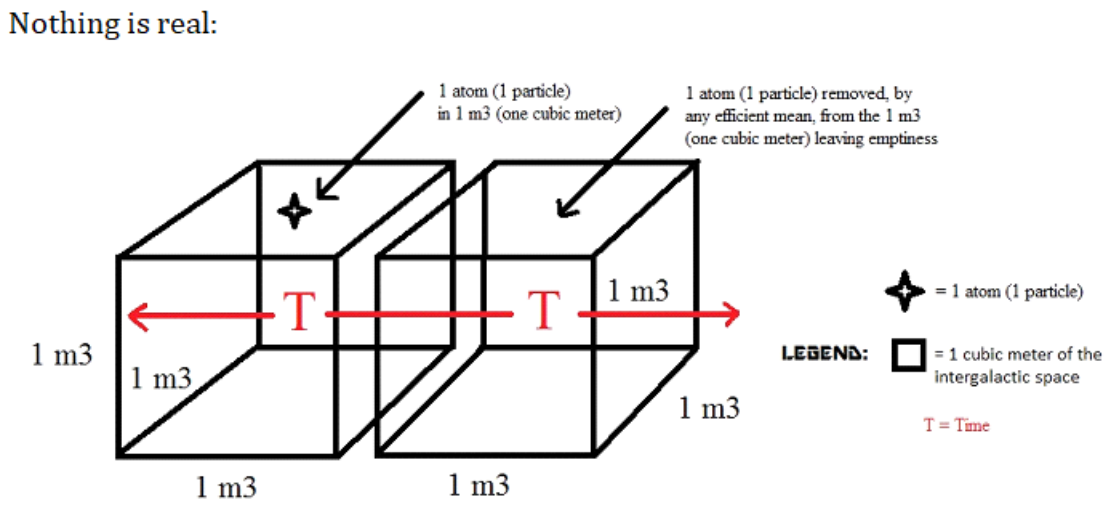
Ad infinitum logic:



How could nothing lasted for an eternity since there is a point when and where The Big Band happened? Because in order to have eternity you don`t need to have infinite line in both directions – you only need infinity in one direction which is past in our case. Time line can stretch indefinitely in the past having one side fixed or branched at the moment of the Big Bang.

As well as empty space gives meaning to the cup in the same manner empty space gives meaning to the Universe. Likewise our houses have yards that separate private from public making a barrier. Try living without a yard, road, field or green surface. Try living without an intermediate zone between you and the surroundings. Emptiness in the Universe has actual purpose of the separation.

Nothing is real:



To get the perspective how nothing looks like we can go on a space trip starting from the Earth where air has density of 10`19 particles in the 1 cm3, then cross into the interplanetary space where density is 5 particles in the 1 cm3, further into the interstellar space with 1 particle in the 1 cm3 and finally we arrive in the intergalactic space where density is only 1 particle per one cubic meter. If we, by any efficient mean, remove or neutralize that particle then we have 1 m3 of nothing – nothing with volume of 1 m3 and Time exists regardless of the matter deficiency.

Stages in the density of the Universe (interplanetary/interstellar/intergalactic) offer insight into gradual transition from something to nothing and reverse.

Earth atmosphere Interplanetary Interstellar Intergalactic Density 10`19 5/cm3 1/cm3 1/m3.

Therefore, Time doesn`t need any condition or circumstance to exist.

Of course, things aren`t that simple: intergalactic emptiness, cosmic vacuum, actually is not nothing although it visually appears like that on the first sight. There are electromagnetic radiation, magnetic fields, dust and cosmic rays. Our imagination should go further beyond just removing a single atom. We must neutralize all the prementioned and then we still do not have nothing because there is one remnant left - vacuum or zero-point energy. So, there is plenty of work to make nothing out of nothing but I think you get the picture how nothing looks like.

Can you imagine nothing? No objects, no galaxies, no dust, no cosmic rays, no vacuum energy, no space, no time: no Universe. Absolutely nothing.

Now think, can nothing have any property/ies since it is nothing? What could property/ies of nothing be? If there is any at all?

Does nothing have borders? How can you margine nothing? Therefore, it has infinite volume to begin with. Like limitless canvas to paint on. This immediately implies two instances of nothing: property (volume) and value (infinite).

What about the age of nothing? How old is it? Remember that there is no Time because the Universe hasn`t formed yet. Does "No Time" mean zero (0) Time? How long will you wait until smallest amount of time pass if there is no time? You will wait for an eternity. Hence, nothing has the age (property) and value (eternal).

Already we have two properties (volume and age) and their two attributed values (infinite and eternal). Distinct metaphysical nothing from the ordinary term which is used in an everyday life for the common purposes such as when saying "nothing happened" or "there is nothing in the box".

What happens next? What happens after Nothing exists for an eternity? Can anything last longer than eternity? It can`t or it was not really an eternity. So, by mere logic, Nothing transforms into the initial singularity or first quantum fluctuation separating Nothing into the two opposites: zero into the plus one and minus one or, numerically, 0 = +1 -1. Here we have very interesting relation with the Zoroastrianism (founder: Zoroaster) and Taoism (founder: Lao Tzu), occuring nearly at the same time (both respective founders lived in the 6th century BCE): while Zoroaster spoke of the cosmic duality, in the form of two opposing forces - the Good (Ahura Mazda) and Evil (Angra Mainyu), Lao Tzu revealed that Tao gave birth to the One which produced two (allegedly named Yin and Yang subsequently). Schuster is credited for the first use of the term "anti-matter" but it seems that Zoroaster and Lao Ttzu were actually the first ones talking about it - not in the exact words although - some 2500 years earlier. Remarkable indeed.

The process repeated, bit by bit, evolving accordingly with the each step in respect to the quantity and diversity. Science named that process inflation and it happened in such a short period of time, 10 -43 second called the Planck Epoch, which was one of the crucial factors needed to stabilize the system or, in other words, to preserve a certain amount of the matter intact and a certain amount partially intact (dark matter). The rest 70% went hello and goodbye!

Baryogenesis: formation of the particles

baryons = particles

+

genesis = formation

How did an opposites pulled through without total havoc taking place? Experimentally confirmed, anti-matter exists in the small quantites observed and can be created artificially. Where is all the rest?

This operations came to my mind by common sense:

fields yield particles

diversification (matter and antimatter)

modification (charge expulsion)

coupling / decoupling

shuffling (perturbation)

(re)combination

expansion (separation)

rule of physical forces

Diversified, modified, (de)coupled, shuffled (perturbated), (re)combined, separated by the vastness of the intergalactic vacuum and subdued to the physical forces. Our own anti-matter copy could have been fragmented and distributed between many different galaxies with millions or billions of light years gap between each piece.

Or black holes could be the reservoirs of an anti-matter. If matter exists above the Higgs field isn`t it logical then for anti-matter to fall beneath since it has the negative mass? Why do sudden energy releases occur along the axis of the rotation? Perhapse an amount of matter was trapped by the black hole`s gravity pull and then thrown back.

Discoveries of the positron (1932.), anti-proton (1955.), anti-neutron (1956.), creating and trapping the antihydrogen atoms (positively charged positron orbiting a negatively charged antiproton) in CERN (2011.), Deep Underground Neutrino Experiment (DUNE), still unconfirmed theoretic predictions and the rest of the efforts made by different laboratories around the world encourage the theory that anti-matter is real and lurking somewhere, probably, in the cosmic depths or it is right here and now, in us and around us, embedded and tamed to serve us instead of destroying us.

Each particle of the matter has a mass and a charge (either positive, negative or neutral). Antimatter particles look almost like their counterparts: they have the same mass but opposite charge.

In 1928. Paul Dirac integrated quantum mechanics and special relativity into an equation describing movement of electron.

$$(\beta mc2 + c\ 3\Sigma n=1\ \alpha n\ pn)\ \Psi\ (x,\ t) = i\ \hbar\ d\ /\ dt\ \Psi\ (x,\ t)$$

β - Beta particle (electron)

m - rest mass of an electron

c - speed of light

α - angular acceleration

p - momentum component

Ψ (x, t) - wave function for (x, t)

i - imaginary number

$\hbar$ - reduced Planck`s constant

d/dt Ψ - derivative how wave function changes with time

Solution of this equation has two possible results: positive and negative

charge. Based on it, three years later, Dirac predicted existence of antielectron (antimatter), hypothesized by Arthur Schuster in 1898., which was subsequently discovered by Carl Anderson in 1932. and named positron.

What about the neutrino - the most abundant particle in the Universe and fundamental meaning it isn`t made of the smaller pieces? Neutrinos have neutral charge. Does it mean that neutrinos don`t have their antiversion? It seems so but scientists aren`t sure yet. Neutrino is a product of the radioactive decay but it also comes from many other sources like the nuclear fussion and as a result of the super novae (star explosion). Neutrinos are also incredibly small and light. They have tiny mass traveling near the speed of the light. They are the lightest of all of the subatomic particles that have mass. Their mass is so small that it can not be measured with current technology. They are extremely hard to detect: most neutrinos will pass through the Earth without any interaction! Although Wolgang Pauli first spoke about particle with properties like neutrino Enrico Fermi was the one who first officially used that term. There are three types of the neutrino: Tau, Muon and Electron. The very interesting thing is that neutrinos oscillate between three modes rather than stick to just one. Funny bunch, always smiling and cheering people up! Not like those lurky black holes. Perhapse neutrinos pass through the black hole as well. Can we do the spectrometry of the black hole using the neutrino-based scanner?

There is a hypothesized particle called axion but its characterics (neutral charge, very low mass, weakly interacting with the ordinary matter) look very much like those of the neutrinos.

Theoretically proposed in 1964. by Murray Gell-Mann and George Zweig quarks as nucleus constituents were experimentally confirmed four years later. Why is there six quarks when you need just two for proton and neutron (Up and Down)? Why is there such discrepancy between quark weights? Why is mass expressed with units for energy (eV)? CERN scientists say that they discovered Higgs boson in 2012., colloquially known as "God particle", which decayes into smaller particles. If that is true how come Top Quark (173 GeV/c2) is heavier than Higgs boson (126 GeV/c2)? If it is a fundamental particle why do you see Higgs boson in only 1 out 1,000,000,000 (billion)

collisions? Such statistical rarity is called exception not rule and should be referred to as anomaly not pattern. I am not opposing an underlying theory, made by Peter Higgs, but the technique used (crashing particles in collider) and standard model based on its results. If you tear apart a billion papers or broke a billion cups to find piece of certain weight can you proclaim it to be the fundamental building block of paper or cup? No because basic building block is still an atom with its internal structure. By crashing particles you start from the phase when they exist but expect to travel back and see what was before. Therefore, idea may be right but the method used is certainly wrong. Otherwise, time machine has already been invented. It is called Large Hammer Smasher.

If Higgs boson really was the primordial particle which immediately decayed into smaller ones that decay could have been exactly the consequence of annihilation between matter and antimatter while 30% of particles survived, went through baryogenesis process and formed the Universe as we know it.

On contrary, I think that the first matter-antimatter pair created was Deuterium consisting of Proton and Antiproton (Proton and Neutron plus Electron) as related counterparts. Most of it mutually annihilated giving initial push for fission which released neutrons leaving Protium as the most abundant Hydrogen isotope in the Universe. Free neutrons started hitting other particles. Energy from fission raised temperature (pressure) enabling fusion of two Deuteriums and producing Helium-4 the most abundant isotope of Helium in the Universe. In Big Bang nucleosynthesis several types of fusion occured producing certain isotopes such as Tritium, Helium-3, Li-7 and Be-7. Elements lighter than Iron have been produced in stars, through process called stellar nucleosynthesis, while Supernovae explosions created the heavier rest.

One thing is sure: that first part of Universe creation was extremely chaotic.

Universe

From ancient astronomers of China and India, antiquity, Copernicus, Galilei to Newton and Einstein, human understanding of the Universe has changed. For a long time people believed in static model but today prevailing theory is The Big Bang. It is not an explosion but an expansion of the spacetime as described by the famous Albert Einstein in four dimensions: 3 spatial and 1 temporal. The scientist is still right, indeed his entire postulates of relativity have been retained, many proven, but since then the Higgs boson has been found and we have come to new, intriguing insights into the nature of the reality. Underlying the Cosmos, on miniature, subatomic levels, different laws apply than those to which we are accustomed in everyday life, even in classical science. At the particle level, the laws of quantum physics apply: things are and are not at the same time and information travels instantaneously, without any delay, regardless of the distance.

Age of the Universe is 13.8 billion years with diameter approx. 92-95 billion light years but that is just a visible part of the Cosmos. What is an actual size – we can only estimate.

Baryonic acoustic oscillations (BAO) are density fluctuations caused by mechanical waves disturbances in pressure of hot plasma during an earliest stage of the Universe development when photons were obstructed in their motion. As plasma sufficiently cooled, some 379,000 years after the Big Bang, protons and electrons formed Hydrogen atoms while photons became able to travel around due to the Universe transparency.

Cosmic background radiation is the microwave glow discovered in 1965. by radio astronomers Arno Penzias and Robert Wilson. Do you remember snowing effect, noisy black and white dots, on the screens of old tv sets? That is it.

Statistical analysis done by scientists at University of Oxford, led by Mihran Vardanyan, combining results of BAO and standard candles type 1A Supernovae measurements, revealed that an actual size of the Universe could be at least 250 times larger than its observable part or at least 7 trillion light-years in diameter.

Accepted cosmological model is Lambda cold dark matter (ΛCDM). Lambda constant, related to dark energy, means that Universe is expanding. Cold refers to slowly moving particles, dark that it is not responding to electromagnetic radiation. This model gives good frame for explaining CMBR, distribution of large-scale structures, observed quantities of Hydrogen, Helium and Lithium, accelerating expansion.

The universe is isotropic, homogeneous and flat. Isotropic means that it is equally distributed in all directions, homogeneous that it is of the same composition wherever we look. This is proven with the Hubble and Planck deep space image of background cosmic radiation but the new James Webb space telescope will certainly capture very interesting scenes as well. We are already enjoying improved photos of space dust from which new stars and distant galaxies are formed under the influence of gravity. Little by little, Webb will advance our vision of the Cosmos like no telescope before. There are several reasons: we have not yet recorded in that part of the infrared spectrum, the position in the Lagrange 2 point and using a special shield which means that there is no interference with sunlight.

Density of Universe expands in all directions without becoming positively or negatively curved. Ratio of observed and critical density (Ω) is equal to 1. CMB trigonometry reveals no curvature. BAO suggests flatness, inflation theory as well. Problem is that we can only see visible part of the Cosmos: beyond that point - we are practically blind. Another challenge comes in an evidence gathered by group of scientists in 2019. (Melchiorri, di Valentino and Silk) whose findings of higher critical density (six Hydrogen atoms per cubic meter) and data deviation present in PL 2018 observations hint to the possibility of closed Universe. However, flat model still remains the standard.

Field theory is an idea that reality as we know it, matter and energy, arise from an underlying base. As a concept it was invented earlier but first significant step came in the form of Maxwell equations which related electricity and magnetism revealing existence of an electromagnetic waves traveling at the speed of light. Max Planck found that atoms are harmonically oscillating absorbing and emitting energy in miniature amounts called

"quanta". Furthermore, Paul Dirac discovered that these quantum harmonic oscillators are always vibrating, have a non-zero lowest energy in a ground state and produce quantum fluctuations in an empty space (vacuum) as well. Terms quantum field (QF) and quantum electrodynamics (QED) emerged.

Inflation is an ultrafast rise from singularity, when density decrease, rescaling due to the suspension of an absolute coldness entrapment, followed by structuralization of the quantum field, having intrinsically associated physical laws, and an annihilation of matter and anti-matter as initiator for fission which in its turn started fusion. Since nothingness possess property of inertia it exhibits resistance to change. To advance fusion, pressure had to be introduced. As first black holes formed, positive outside pressure (dark energy) overcame vacuum defiance and pushed the boundaries toward beyond. Positive inside pressure (gravitation) enabled heavier fusion inside stars. Universe cooled by dissipating heat in order to restore thermal equilibrium. Our cosmic fate is ultimate dissolution, energy will return to the underlying dark cape which will frozen compress back to singularity. New cycle of existence begins after an ice has melted. Universe could move like jellyfish meaning there is a higher dimensional displacement associated to each individual span.

Holographic Universe theory is a very intriguing concept, worth mentioning as one of the possible mechanisms for cosmic emergence. Leonard Susskind, professor at Stanford University, said: "The Universe is a hologram, an image of reality coded on 2d surface". Juan Maldacena, professor at Institute for Advanced Study in Princeton, N.J., explains that our 4d spacetime could be a holographic projection. Using combined AdS/CFT approach he found that this duality could describe the same physical system, despite difference in dimensions and gravity, because both models are scale invariant: by increasing an entanglement of CFT subsystems - topology of AdS spacetime begins to connect. Herein, similarity between holographic and string framework is notable: they both arise from downward. According to holographic principle, reality emerges as a consequence of CFT subsystems entanglement. According to string proposition, reality is acchieved with vibration of one-dimensional objects having D-branes as end points serving to prevent collapse. Eventually, Universe becomes a full geometrical representation of a quantum origin manifesting specific phase transition from

laws of subatomic realm to domain belonging to general relativity. Shinsei Ryu and Tadashi Takayanagi came up with conjecture that an area of the surface of a black hole is related to an entropy of a quantum system. Years later, Engelhardt and her colleagues proved that calculations are possible and that Hawking radiation is consistent with laws of quantum mechanics (no loss of information). Regardless of their veracity, e.g. AdS has negative curvature, attempts like these will help us discover theory of quantum gravity.

Due to evident discrepancy between macro and microcosmos, theory of quantum gravity wants to incorporate laws of general relativity and those of quantum mechanics into a single framework. Loop Quantum Gravity uses network of loops integrated into spin matrices to describe structure of the spacetime continuum.

We can declare that something is limitless because we can`t count each piece but is it actually infinite or we just consider it to be due to our counting inability? Did you ever saw an infinite number? How do you know it exists? Well, it doesn`t exist in any other way than mere speculation, based on the previous statistic pattern, expressed by the symbol ∞. It exists only as a never reached potential. We are always step behind, one moment late, if we chase destiny. Instead of chasing it – ride with it. Once you ride with it you do not have to follow it because it leads you. It is the nature of things to obey cosmic laws. Like train on tracks. If you turn – you fall. If you drive straight – you reach the station.

Universe does not have to be limitless to be infinite for us. It is enough to be of unreachable margine or curved back on itself (closed). Undefined is as good as infinite for us humans, feedback loop would take too long to complete. That is why I say: Unseen roots of no prior cause.

Most interesting phenomenons in the universe are:

Singularity – point of infinitesimal size and immense energy. We must

distinguish an initial from which the Universe emerged, derived by extrapolating galaxies, and mathematical located at the center of the black holes - theoretical because we haven't explored any black holes yet. Simply said, a point of smallest magnitude where all mathematical calculations lose meaning. Basic singularity is the function f(X) = 1 / X in which X = 0. How to divide by zero?

Inflation – theory devised by scientist Alan Guth describing the period of ultra-rapid development with devaluation of the cosmological constant. It explains many problems like quantum fluctuations transition to the macroscopic scale, why is Universe isotropic and homogeneous as well as why the cosmic microwave background radiation is identically distributed, why temperatures and curvatures in far regions are almost equal (without inflation velocity laws of thermodynamics would be violated, curv. = 0), flatness, horizon (communication) and lack of magnetic monopoles. However, this process would never end without some sort of stopping mechanism. Proposed by Andreas Albrecht and Paul J. Steinhardt, Hubble friction is gravitational effect of an expanding universe ("slow-roll") which explains density fluctuations, that is, rise of galaxies and temperature variances in the cosmic microwave background. Another significant contributor to inflation theory is Andrei Linde who introduced ideas such as cosmological phase transitions, false vacuum and multiverse.

Multiverse - idea that reality is structured of many, possibly countless distinct (parallel) Universes.

Multireality - idea that overall existence is structured of many, possibly countless distinct (alternate) realities.

Herein I must mention two types of events reported by some individuals. 1) First is Deja Vu or feeling that particular situation has already occurred. Most likely it is caused by hippocampus disorder, prefrontal/neocortex short circuit or delay in processing. Popular (mis)conception is glitch in the system implying that we live in a simulation. 2) Second is alternate past recall (Mandela Effect) or memory that things happened in different way than

commonly believed. Most probably this is a consequence of short/long term memory problem, having certain neurological origin, or it could just be a matter of brain imperfection since remembering is reconstructive process, susceptible to confabulation, cognitive biases, memory consolidation, false memory syndrome, social dynamics and cultural influences, not exact reproduction such as listening to the music cd. Bold interpretations are convergence of Universes or realities and temporal interference - a junction point where various particulars, parallel Universes, alternate realities or different time lines, meet.

Other dimensions - could have vertical, horizontal or angular displacement. Or they could be reached through zooming in and out of the Universe (reality).

Gravity – still an unexplained physical force different from electromagnetic, strong (between particles) and weak (decay). Some scientists believe in existence of gravitons as mediators of the gravity force.

Neutron star – stellar object almost entirely comprised of neutrons. I roughly calculated that a teaspoon full of neutron star, if we could seize it like that, weighs like Earth`s moon. There are pulsars and magnetars. Pulsars periodically increase an intensity while magnetars exhibit magnetic field due to rotation. Chandrasekhar calculated the limit of 1.4 solar mass needed for a stellar object, after consuming its fuel, to become neutron star.

Black holes – cosmic objects that can have mass from 2-3 Suns up to 100 billion solar masses, primordial even more. Some rotate and create the magnetic field. Tolman-Oppenheimer-Volkoff limit of 3 solar masses is needed for a star to collapse and create the black hole. However, some black holes have 2-3 masses of the Sun so I take this TOV limit with a small reserve. There are ordinary black holes formed by a collapsing star and supermassive that are located at the center of almost every galaxy and act as an anchor holding the galaxy together.

Quasar – is a very luminous active galactic nucleus found in the central region of a galaxy housing supermassive black hole surrounded by swirling matter falling inside and in return emitting large amounts of radiation across entire electromagnetic range.

Dark matter – form of matter counting for about 25% of the Universe (amount of ordinary matter is about 5%). It cannot be detected in the visible part of an electromagnetic spectrum but attracts things, inflicts gravity. My theory is that this form of matter was created during the Cosmic Dark Era and belongs to Bose-Einstein domain meaning it doesn`t obey Pauli exclusion principle. You send photons in and they do not excite neighbouring electrons because these exotic electrons are true social animals, totally used on having close company beside. You need to be much more sophisticated in your approach. Maybe, neutrino based spectrometry can play a role here? Another idea, much more phantastic, is that an alien civilizations camouflaged their habitats with transparency effect.

Dark energy – form of energy that could be remnant of matter-antimatter annihilation, consequence of sollar radiation and overall matter decay, responsible for an (accelerated) expansion of the Universe and tightly associated with cosmological constant Lambda, Λ.

Gamma Ray Bursts - powerful gamma-ray emissions (radiation in gamma part of an electromagnetic spectrum) occur when a massive star collapses, forming a black hole, or when it explodes as Supernova.

Swift Observatory and Fermi Gamma-ray Space Telescope have jointly detected such an event, brightest ever, designated as GRB 221009A happening about two (2) billion ly from Earth. This particular burst was so intense, carrying enormous energy, that briefly dazzled scientific equipment. Luckily, China’s GECAM-C jumped into the picture allowing for measurements to complete.

Unsolved mistery is how photons travel for such an astronomical lenght. One

theoretical explanation is that they are converted by magnetic fields into a hypothetical, dark matter particle called axion and reconstitute back after entering a magnetic field again. This theory is supported with findings from NASA space observatory Imaging X-ray Polarimetry Explorer (IXPE) and European Space Agency's (ESA) Integral satellite. Apparently, magnetic sphere directs black hole radiation producing energy jets which create more power in a second than Sun during its entire, ten (10) billion years lifetime.

But what was the cause of this 18 TeV blast that outperformed Large Hadron Collider (LHC) energies ranging from 6.8 to 13.6 TeV? Most probably, merger of two neutron stars resulting in a magnetar birth - large, fast spinning neutron star enforced with strong magnetic field not further transforming into a black hole which happens within milliseconds of time.

In 2024., Large High Altitude Air Shower Observatory (LHAASO) in Daocheng County, China, recorded Gamma signal of Peta scale strenght (1-2.5), described as made in "bubble structure", originating in Cygnus constellation, which functions as cosmic particle accelerator driving energies up to 20 PeV before releasing them into a space.

Neutrinos - massless electron, muon or tau particles, produced in extreme cosmic environments like star outbursts, neutron stars and black holes merge, which are extremely hard to detect due to their infinitesimal weight and evasive skills. Neutrino based spectrometry could help us directly detect dark matter and scan black holes inner structure.

IceCube Neutrino Observatory, built under the South Pole ice crust, and KM3Net (Cubic Kilometre Neutrino Telescope), constructed in Mediterranean Sea, serve the same purpose: detection of Cherenkov radiation, an electromagnetic emission, first observed around submerged nuclear reactor appearing as blue water glow. This mesmerizing spectacle triggers when high energy ray moves through medium faster than its respective light speed limit influencing atoms along the path which in turn release photons.

WIMP - weakly interacting massive particle (wimp). Sensor fields in specialized facilities use either magnetic spectrometer, supercooled crystals, liquified Xenon or Argon gas to detect wimp`s. Alpha Magnetic Spectrometer (AMS), installed on International Space Station (ISS), Cryogenic Dark Matter Search (CDMS), Silicon based, and Coherent Germanium Neutrino Technology (CoGeNT), Germanium based, both located inside Soudan Underground Mine in Minnesota, LUX-ZEPLIN experiment in USA, below the Black Hills in South Dakota, and DEAP-3600 array, inside a nickel mine in Ontario, are best examples of such endeavours.

Gravitational waves - curls in a structure of the spacetime.

While measuring time intervals of radio waves emmited by pulsars, fast rotating neutron stars whose magnetic poles blast out energy, scientists at North American Nanohertz Observatory for Gravitational Waves (NANOGrav) detected creases in spacetime fabric of such magnitude that can only originate during supermassive black holes merger.

Experimental search for gravity began in 2015. when Laser Interferometer Gravitational-Wave Observatory (LIGO) sensors, already just after few months of starting the work, picked up subtle distortions.

Due to an individual inadequacy of Earth-based telescopes to properly detect spatial warping, largest telescopes in the world are combinedly used together with a galaxy wide sensor array in the form of pulsar fields.

Telescopes operate in an area known as Radio Quite Zone where wireless telecommunication signals are prohibited in order to prevent interference with sophisticated scientific equipment.

When gravitational waves contract or expand spacetime they also speed or slow time periods between pulsar made radio signals.

This inquiry confirms Eintein`s one hundred (100) years old prediction and is supposed to solve "final fraction of a second" question, link dark matter with primordial black holes and even explain nature of the gravity itself.

Precision has continued to be a limiting factor, due to the "quantum noise" - a smallest scale interference, but in recent years scientists have developed new technique called "squeezing". This approach significantly increases observational capacity at higher frequency level at a simultaneous cost of degrading it at lower ones.

Early (primordial) black holes - presence of supermassive black holes, in an early stage of the Universe development, has been detected in galaxies CEERS 1019, where nine (9) million solar masses giant formed just 570 million years after the Big Bang, UHZ1, where over ten (10) million solar masses behemoth formed 470 million years after the Big Bang, and, most distant ever found, GN-Z11, where two (2) million solar masses heavy object formed 430 million years after the Big Bang, surrounded with pristine Helium alone which explains smaller weight compared to forementioned two.

Discovery was made using deep space survey, with combined Webb infrared and Chandra X-ray efforts, by searching for an unusually shining galactic cores called active galactic nuclei (AGN). CEERS team, led by prof. Finkelstein - an astrophysicist from University of Texas at Austin, detected very fast moving gas which suggests strong gravitational pull originating in the middle of a clump.

These primordial black holes, predating galaxies formation, were created due to a collapse of an enormous particle clouds.

Universe faster expansion - by determining a rate of cosmic spread, called the Hubble constant, scientists estimate an age of the Universe to be 13.8 billion years and predict final possibilities such as never stopping

expansion, collapse or rip.

There are two methods of calculating the Hubble constant: 1) Supernovae and pulsating stars (Cepheid variables) distance and movement monitoring, 2) cosmic microwave background radiation analysis. Results differ. First method yielded 73.3 km/sec/Mparsec (Hubble/Gaia) while second (Planck) gave 67.4 km/sec/Mparsec rate of expansion. This discrepancy is called Hubble tension. To resolve it new method has been developed which includes detection of a gravitational waves from colliding neutron stars. Result is right in between known two constant values: 70 km/sec/Mparsec.

New observations made using Webb space telescope indicate that Universe is receding slightly faster than it was previously thought: 74.03 km/sec/Mparsec. Moreover, expansion is accelerating with distance.

Implications of these findings are shocking especially if we look beyond boundaries of the known Universe: constants value would require adjustment and current scientific views will have to modify.

Magnetic field - is an energized area located around moving electrical charge and materials which possess magnetic properties.

Earth`s burned surface on the west coast of both Americas, practically whole Australia and entire region from Northern Africa, across Middle East and to the Mongolia could be the consequence of cosmic rays and anti-matter past intrusions originating as the strong solar flares or even beyond the system. How does the Earth`s core behave? How long will it last keeping our shield working? Mars doesn`t have strong magnetic field nor the moon and look at their life lacking vastelands. Is this our destiny? Surely, if (when) Earth`s magnetic field seize to exist.

Graviton - hypothetical massless spin 2 particle, proposed by Quantum

gravity theory, responsible for producing gravitational effect. If applied in sufficient amount creates the most extreme spacetime anomaly known, called "singularity".

Imagine sprinter running 100m in 10 seconds. What if we compress the distance into 50m keeping his speed the same? He will cross it in half time or 5 seconds. After he passes the last meter then we elongate 50m back into an initial lenght of 100m. Do you realize what we have achieved? We have achieved running 100m in 5 seconds. Speed has doubled artifically because the lenght was halfened by manipulation of the spacetime.

Darkino - is a graviton counterpart accountable for stretching of the Universe. Maybe it is a same particle but with different, inverse properties?

This duality would perfectly encircle standard model of particle physics to 32 pieces total just like chess set have: 12 (quarks and anti-quarks) + 12 (leptons and anti-leptons) + 5 gauge or vector bosons (gluon, photon, Z0, W+, W-), 1 scalar boson (Higgs) + 2 hypothesized scalar bosons (graviton, darkino).

Phantomino and nihilino - hypothetical scalar boson particles, metaphysical counterparts of graviton and darkino, responsible for creation and destruction of the Universe.

Newton's laws of motion:

1. Object remains still or is in uniform motion until it is affected with force.

2. Period of momentum corresponds to the force.

3. If two objects mutually act with equal force then that force has the same strength but an opposite direction.

Four laws of thermodynamics are:

0) If two systems are in thermal equilibrium with the third then the two are certainly in mutual thermal equilibrium.

1) The total energy of the isolated system is constant.

2) Heat always flows from a warmer to a cooler place, meaning entropy has only one direction: from warmer to cold, not vice versa.

3) An entropy of the system has a constant value when the system temperature falls to an absolute zero.

In accordance with the 2nd law of thermodynamics, Universe inevitably dissipates its heat by expansion awaited by the fate described with the 3rd law and the total energy cannot exceed an initial value which is described by the 1st law.

Elasticity is body`s ability to resist distortion and return to its original state after an influence of the distorting force has ended. According to Hooke`s law, lenght of displacement is proportional to the force exerted.

$F = k\,x$

F - exerted force

k - constant (related to material used)

x - lenght of displacement

Using elasticity analogy, I can explain gravitational force as a tendency of vacuum response for returning into an initial state either by compression or expansion depending on distance between objects (getting closer increases attraction while moving away increases repulsion). To understand it, replace

constant k with cosmological constant Λ.

Einstein`s laws of relativity

Already known to Willem de Sitter that the velocity of light cannot depend on the velocity of motion of a body emitting it, Albert Einstein in his Special Theory of Relativity (1905.) integrates the principle of relativity and the law of propagation of light. Drawing from previous accomplishments done in fields of electrodynamics and (astro)optics, Einstein tells us that laws of physics equally apply for all inert observers, the speed of light in vacuum is same for all observers regardless of the speed of their motion or the speed of motion of a light source and light properties change according to direction of an object`s motion. Relying on Maxwell`s electromagnetic theory, system of equations named “Lorentz transformations" and Zeeman work regarding the light beam division into spectral components, which act is caused by magnetic force, Einstein demonstrates how classical mechanics doesn`t hold for non-uniformly moving bodies. Inside system, time is not absolute but relative, dependent on a position and condition of an object which state can be expressed with Lorentz transformation t` = t - v/c2 x / sqr. (1 - v2/c2) practically observed as time delay: moving clocks tick more slowly than fixed. Next, Einstein unifies two conservation laws for energy and mass determining how body of rest mass m also has rest energy m c2 which potential can be used for conversion into other forms. Complete proof valid for closed, static environment was first obtained by Max Laue in 1911. while Felix Klein in 1918. derived solution for closed, time-dependent system. Finally, Einstein recognizes the speed of light in vacuum as the highest possible speed in the Universe.

In General Theory of Relativity (1915. - 17.) Einstein proposes that objects create a gravitational field around them which enables mutual attraction, bending of light rays passing near and time measuring difference (clocks tick slower). To account for Mercury`s and binary pulsars elongated orbit, space can not be described with Euclidean simplicity but using Gaussian curvatures implying that an idea of a straight line becomes meaningless. Rotating gravity sources viciously swirl their environment along. Spacetime arching, and distribution of mass and energy within it, is explained through Einstein's

field equations (EFE). Clear evidence for an existence of the gravitational fields, and thus practical confirmation of general relativity postulates, came with detection of the gravitational waves. For Einstein, Universe is finite yet expanding.

If most distant regions are expanding faster than the speed of light how does it affect life and physics in those galaxies?

Do you know what is special about water (H20)? It contains an element that was created at the very beginning of The Big Bang, Hydrogen (H), and Oxygen (O) element that is crucial for creating and sustaining life.

Haul! Haul the ship across the vast skies.

From one side to the other in a blink of an eye.

Cause there is no voyage like infinity.

Sail to the horizons, brave explorers of the new worlds.

Let us all embrace this one common task:

Ours, but ours together, is the Universe to be conquered!

Structural models

Minkowski spacetime is a four-dimensional model (4d), advanced modification of the Galilean and Newtonian classical physics, configuration in which position of the object is determined by the four coordinates, three spatial and one temporal, named x, y, z, t. It is Euclidean plane or Cartesian system transformed into triple spatial geometry with added fourth axis representing the time factor.

In order to project physical environment graphically various diagrams were

presented, like the above mentioned, but they are only valid locally. For accurate cosmic depiction enhancement is needed.

Being a flat model, Minkowski diagram follows the Pythagorean theorem which expresses the rudimental link between the three sides of the right triangle using formula a2 + b2 = c2 implicating that the shortest distance between two points in a spacetime is always a straight line, interval invariance having causality as a distinctive property. It is suitable basis for physical systems over finite distances without the gravitation component included.

If we account for the general relativity then we get to a curved rendition yet still an incomplete picture. Introducing Clifford bivector approach, expansion of the scalar/vector field, and Lorentz transformations, six-parameter linear change, we provide a conversion from one inertial frame of reference to the next by enabling rotations (orientation) and boosts (velocity) operations to be performed.

Since dynamics is same in any such frame, Einstein advanced the Lorentz transformations, applying his own principles of physical laws and speed of the light immutability, eliminating the need for an ether.

Integration of the Lagrangian mechanics into the Minkowski diagram enables analysis of particles motion in a selected system as well as dynamics of an entire field yielding a difference between kinetic and potential energy in a form of the Lagrangian function.

f(L) = kE - pE

Hamiltonian dynamics refined Langrangian proposition by mapping a vector using momentum, instead of velocity, thus inducing linear isomorphism between tangent and cotangent framework. Besides inertial reference

frames, having constant speed, there are also non-inertial ones that accelerate.

Clifford’s spacetime algebra extended the Hamiltonian view joining scalars/vectors, complex numbers and quaternions into a single multivector field which allows bivector state to exist simultaneously.

By now we have deep entered the realm of a non-Euclidean geometry. Gauss first introduced the term "non-Euclidean geometry" to define all significant efforts made after an initial attempts for creating the universal framework applicable for entire cosmic surroundings not just regional or closed.

Poincare made further progress adding translation to the symmetry set which, due to the Noether's theorem, necessarily resulted in ten (10) generators being established preserving the spacetime interval and promoting the Hamilton quaternions beyond stationary: 1 for energy (preserved in a closed system), 3 for momentum (constant in a closed system), 3 for angular momentum (conserved in a closed system) and 3 for the middle point of the mass (invariant in a closed system).

Poincaré configuration, named after French mathematician and theoretical physicist Henri Poincaré, is a crucial concept in a modern physics helping us to understand behavior of systems and particles in a spacetime by portraying the basic forces governing the Universe as well as the related conservation laws.

It consists of:

translation (P)

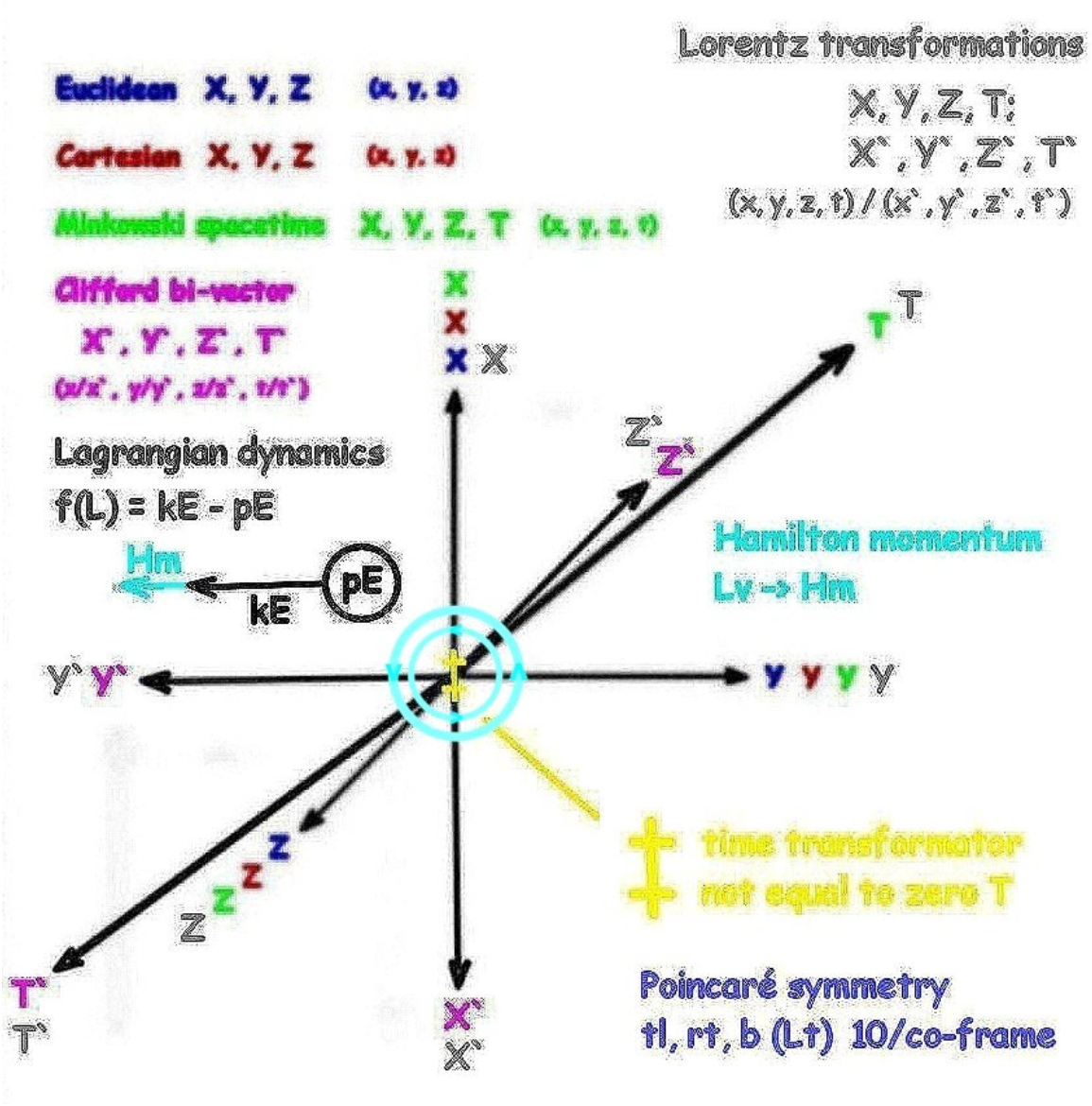
rotation (J)

boost (K)

Translation: change of an object`s position (location) without any influence on its orientation or velocity.

Rotation: change of an object’s orientation (direction) without any influence on its velocity or position.

Boost: change of an object`s velocity (speed) without any influence on its position or orientation.



Poincare system is the most complete spacetime framework ever developed. The most complete yet still not perfect. In order to polish it we need to add the time variable into an equation. It doesn't have zero (0) value because it is not a number but the switch factor, temporal buffer, synchronistic cache, rotadoor, sort of a cosmic exchange office. It is only a potential instantly resonating away chronomorphed. Like heated ice doesn't immediately vapourize and skip the liquid state, past does not turn into the future directly nor present moment is an illusion of the self-being. Time streams through the narrow passage of an existence constantly altering between prior and later, before and after, was and will. Past and future events disclose/unfold like

cards pulled from a fresh deck by the hand of an expert dealer and placed on the table having fine green covering stretched over mahagony wood engraved with gold. They just... Stack. 'n Stick. Tick. Tock. Tick. Tock. What is in-between tick and tock? Now. This moment.

Willem de Sitter developed model of the Universe, called De Sitter spacetime, based on positive cosmological constant, having positive curvature and with positive energy density (opposite is anti De Sitter spacetime).

Are we matter or its emptiness coating? Maybe here as well the sequence is floating, perpetually slipping, intangible and elusive.

Alas, we consider space to be vector like, time of a scalar nature. Meaning, space has both directions and attributed values, while time only has an assigned quantity lacking any specific pointing other than... It goes. It passes, second by second, from and in the direction unknown.

Wait! We are observing spacetime solely from the space perspective using triangulation as a practical method having three coordinates to determine exact position of an object. What if we observe from the time perspective solely? Then physical location becomes irrelevant while time turns into a bivector connecting future and past through a tiny dot called this present moment, jiffy.

Where are we? This question is easy to answer. We are in the Universe, obviously.

But... When are we? Well, this is a lot heavier question than it may appear at a first sight.

What is a future? It is the moment that will happen immediately after now.

What is a past? It is the moment that happened just before the present.

We can not be in the future nor in the past otherwise it wouldn't be referred to as such. We are always in-between.

This circumstance was already noticed by theologian Saint Augustine in 4th century CE. In Confessions, he said that "if future does not yet exist, past no longer exists and present takes no time at all then how can time exist?".

Does present exist? There are just two possibilities - it does or it does not.

If present does not exist (takes no time at all) that means temporal flow is only an illusion. It is how we perceive reality not how reality actually is.

If present does exist (takes some time) then it is ultraslim, infinitesimal, Planck sized quantity separating the future and the past.

I call it the "Time Transformator".

Watching the horizon, in far distance, what is it actually? Is it an edge of the landscape or the first layer of air above? Or imaginary, illusionary border separating geosphere and atmosphere?

We are like narrow middle section of a sand glasshour having only one grain width. Up is one grain higher, down is one grain lower. Therefore, it must exist a state which is not up nor down but an equilibrium intermediate, the reference point. Without it you are either up or down which is paradox

because up or down are something which can never be reached: an intangible potential just like the future or the past moment.

States, if you are in one then it is not real.

We are now.

Not after or before.

Time is a side-effect of an energy transformation.

Quantum physics

Exactly same thing happened with the micro as with the macro world: people didn't believe in it until they saw it with their own eyes. It wasn't until we made first telescope that we could see the stars. It wasn't until we made the first microscope that we could see a cellular structure. Now people don't believe in quantum physics even though there are particle accelerators. The problem is that we descend to an even lower level than microscopic where we cannot see things and events but we can only detect and calculate probabilities.

Strongest microscopes are transmission electron microscopes (TEM). They can enlarge an object 50 million times (5 x 10`7) but can not observe in 3D technique and they are only good when samples are very thin. Scanning electron microscopes (SEM) magnify up to three million times (3 x 10`6) using 3d technique of scanning by layers so the final image is significantly more detailed. Proton diameter is of 10`-15 scale (0.8 femtometer) while diameter of quarks is even hard to estimate, roughly two thousand times smaller than proton`s. This is the reason why we can not see things on the quantum level.

Term quantum (translated from Latin as "how much") is derived from the word quant(a) which Max Planck, founder of quantum theory, used to describe the smallest possible amount of energy. The quantum of electromagnetic force is a photon. Both electron and photon possess dual particle-wave properties which is proven by an experiment with 2 openings (double slit experiment).

Quantum mechanics is the field of physics that work with subatomic physical quantities and fundamental phenomena explaining the characteristics and behavior of tiniest components existing in nature. It reveals to us that energy is emitted, transmitted and absorbed in quantum (quanta).

Max Planck determined the infinitesimal quantities of time (10 -43), space (10 -35) and mass (10 -8 kg).

To start explaining the quantum realm we need to know basics of particle physics and nuclear physics. The elementary division of particles is into fermions (quarks: up, down, enchanted, strange, top, bottom; and leptons: electron, muon, tau and 3 neutrino combinations of the same) or building matter and bosons or force mediators (gluon, photon, Z and W boson). Gluon holds quarks together (strong force), photon is the mediator of the electromagnetic force, Z and W are the moderators of the weak interactive force. In addition to the 5 previously mentioned gauge or vector bosons, there is a scalar boson called Higgs which is responsible for the allocation of mass to the particles reacting with its field.

Nuclear reactions can be fissions (breaking) or fusions (joining) atoms. In fission, the neutron hits the nucleus, usually Uranium or Plutonium, and breaks it down into constituent parts, releasing enormous energy. In fusion, two atoms are pressed together and create a new heavier. For example, two hydrogen atoms produce the helium atom. The fusion process keeps the star active and thus defies gravity. It generates much more energy than fission but requires enormous pressure and a temperature of 15,000,000 degrees

Celsius which is possible only in star cores or during supernova explosions (for elements heavier than Iron). In a nuclear bomb, the pressure is enlarged with a limited space, which is significantly smaller than the sun's core, and a far higher temperature than in the sun's core, as much as 100-300 million Celsius. Once nuclear fuel is depleted, the star collapses into itself under the influence of gravity and, if the singularity theory is correct, ignores the Pauli exclusivity principle by ultimate compression.

Is there a quantum field? Judging by what we know about entanglement and superposition it seems to exist. Experiments have been conducted showing that entangled pair of photons separated by thousands of kilometers still exhibit mutual connection: information somehow traveled without any delay. Superposition is the state where two or more possibilities exist simultaneously until observed. Schrodinger cat example is not animal friendly therefore I will use another one. Let us imagine closed box with turtle and some clover in it. Until we open the box and observe our turtle could have either eaten or not eaten the clover. Moreover, it could have already digested it. When we look then we know because all possibilities collapse into single one. Similar example is tree falling in the woods without any observer. Did the tree actually fall if no one saw it falling? I must remark that things happen regardless of attention (not) given. Much better examples are found on a subatomic level where our thought really can affect an outcome of experiment due to the fragility related to quantum scale events. Decoherence: an electron acts like a wave until we look at it and when we look at it wave collapses and acts like a particle.

Entanglement: two objects connected or paired into a single system, e.g. two photons or two electrons, retain their shared characteristics very far apart from each other. Laser and special crystal are used to divide particle in two pieces which remain in perfect mutual correlation therefore disrupting principles of locality and causality. Einstein, Podolsky and Rosen proposed the possibility of hidden variables but later work by Bell and Clauser eliminated this possibility.

Superposition: An object can be in a multiple states simultaneously and may show different measurement outcomes for each of these special states.

There is a phenomenon called quantum tunneling that plays an essential role in nuclear fusion and alpha radioactive decay. When particle reaches an obstacle it disappears and appears on the other side. It was as she had dived into a quantum field and bypassed an obstacle by traveling below or outside spacetime. Given that the temperature at the center of a star is too small to overcome the Coulomb barrier the situation can only be explained by the QT phenomenon.

The Higgs field is a universal energy field that uses its scalar (chargeless, spinless) boson to allocate mass to particles which is called the Higgs effect.

There are three statistics: Fermi-Dirac, Bose-Einstein and Maxwell-Boltzmann. The first applies to particles with integer-and-half spin that respect the Pauli exclusivity principle which means that identical particles cannot have same energy state while other two are valid for particles with integer spin and do not respect PEP which means that they can occupy same energy state or position in the quantum field.

Spin is an intrinsic property of the tiniest particles, quantum mechanical form of angular momentum (rotation). When Helium is cooled down and reaches the Lambda point atoms suddenly turn into quantum vortices. Talking about Helium becoming superfluid it also enters the quantum state: it is and it is not viscous at the same time which is proved by kinetic drag and micron porosity experiments.

Field theory say that there are energy fields interacting with matter through Maxwell's (electromagnetism) and Einstein's field equations (geometry of the spacetime).

Quantum mechanics is already used in microwave ovens, fluorescent bulbs, semiconductors, lasers, MRI (magnetic resonance imaging) and in atomic clocks.

Moreover, it is noticeable in many life phenomena although we have never paid attention to it laconicly attributing all phenomena to the laws of macro-physics. Here is one example: a small worker's salary in parallel is and is not – "it is" because it has certain amount and "it is not" because it has already been spent in advance.

Combining the formulas E = m c2 and E = h v we realize that everything has frequency. Matter oscillates, wobbles on an energy fields.

In 1913. Niels Bohr introduced Rutherford–Bohr model of an atom proposing that electrons move in orbits having angular momentum defined as mvr or nh/2π and that electron can change orbit by emitting or absorbing quanta of energy.

m - mass

v - velocity

r - radius of nth orbit

n - orbit

h - Planck constant

π - Pi

Werner Heisenberg postulated uncertainty principle which states that it is not possible to simultaneously measure the position and speed of a particle at the same time both with the maximum precision.

Thus, Bohr’s defined orbits were replaced with probability ones.

Schrödinger's equation (named after Erwin Schrödinger) formulates wave

function of quantum system revealing position and momentum probabilities.

$H \Psi = i \hbar \, d / dt \, \Psi$ (short version)

H - Hamiltonian operator (sum of potential and kinetic energy)

Ψ - wave function for (x, t)

i - imaginary number (solution of quadratic equation x2 = -1)

ħ - reduced Planck`s constant (divided by 2π)

d/dt Ψ - derivative how wave function changes with time

Feynman diagrams are schematics depicting particle interactions on the subatomic level or their decay. Each diagram has an associated mathematical expression. One simple example is electron (e-) and positron (e+) annihilation creating photon (γ) which in turn creates new electron and positron.

e- + e+ -> γ -> e- + e+

Feynman–Stückelberg interpretation presents an antiparticle as moving back in time.

Frank Wilczek discovered asymptotic freedom in strong interaction. Atomic core is connected with the bond that keeps not only protons and neutrons together but also their constituents - quarks. When quarks from different sources come very close to one another they behave loosely.

Quantum computer: compared to a conventional circuit that uses bit(s) stored on transistors, the quantum computer uses qubit(s) stored on a superconductor or in a special crystal where lasers trap ions. Qubit is a bit in

superposition, both 0 and 1 at the same time. Considering the power of such devices in the foreseeable future it will be possible to decipher even the strongest available RSA encryptions.

While simple, commutative logic states "1+1=2", quantum logic implies "0/1+0/1 = 0 1 1 2 or total of 4". What about three-body problem? Unsolvable, they say, because we have to compare three sets of data. Any deviations from initial variables, even belonging to fixed, sustainable system, result in chaotical turmoil. Why don`t you compare changes between sets instead? Go an octave higher to find mutual harmony, solution of the riddle... Triantum, nature of the reality is, unifying symphony of different frequencies originating as movements in the mantle of the wellspring. Obviously, function is transmutable and self-adaptive. In classical sense formulated by Newton and revised by an initiator of Pi, f(x), i, Σ and e, contemporary Leonhard Euler while equations regarding three dimensional environment were derived by Joseph-Louis Lagrange. Accounting for gravitational, centrifugal and Coriolis force, Lagrange points determine exact position where placed object maintains its stationary relativeness. Since Henri Poincaré proposed an infinite number of possible solutions, thousands were obtained by worthy mathematicians all around the world. Nowadays, computer simulations are produced including electromagnetic and special relativity influences. However, general solution still evades the radar.

Time crystal is a new state of matter, in addition to: solid, liquid, gaseous, plasma (gaseous state rich in charged particles or ions and fuzzy electrons, example: aurora, lightning, neon advertisements, welding tools, plasma ball) and Bose-Einstein condensate (supercooled diluted gas e.g. rubidium atoms in which a large number of particles are in the same energy state). It is the crystal that periodically changes its configuration without energy modification.

Synchronicity

Waiting for public transport to arrive at station, not once I have accidentally looked at someone from behind. Occasionally, that person turned and looked

me straight into my eyes. It could be coincidence since it rarely happens. Maybe it is related to an observation effect noticed in double-slit experiment manifesting due to the fact that both observer and observed are connected by the same underlying foundation. Or certain people possess deeper perception than others (hypersense).

https://www.jneurosci.org/content/33/25/10483

Psychic staring effect is explored since 1898. without giving convincing results. However, studies done in 2005. and 2013. by Alan J. Pegna and colleagues, published in the Journal of Neuroscience, caught my attention. They involved subjects with cortical blindness (lack of conscious sight due to a bilateral damage of the visual cortex in brain) to whom facial images were shown. Some had faces looking at the subject, some away from the subject. fMRI revealed increased activity in right amygdala, with success rate notably above probable, when faces looking at the subject were presented. This phenomenon has been termed “blindsight" by Weiskrantz in 1974. It occurs during motion detection, target localization and pointing but also upon emotional stimulus (de Gelder 1999.). Conclusively, in absence of awareness alternate brain channels could be used to bypass regular sensory pathways.

Quantum theory predicts correlations which cannot be causally explained, such as quantum entanglement, suggesting field(s) interaction with matter on a subatomic level while C. G. Jung talks about uncausal synchronistic events.

What are "quantum field" and "collective unconsciousness" if not the same thing? Or at least directly connected or co-related.

Synchronicity: "an Acausal Connecting Principle", as described by C. G. Jung, says that natural laws are statistical truths but on the infinitesimal scale predictions become uncertain meaning the causality is no longer valid. I argue that maybe it is just not visible due to our limited insight.

Scientific view of the world, experimental method of an inquiry rules out unique or rare events. What we call "chance", "coincidence" or "magic" could be a causality which has not (yet) been revealed.

Jung reasons that inexplicable is not due to the cause being unknown but due to the fact it can not be known using conventional understanding. Spacetime and causality, classical concepts in physics, hence should be enhanced with a synchronicity in order to get the full picture of reality. Especially when space and time lose their meaning or become relative.

Perceptual psychologist Karl Zener and parapsychologist Joseph Banks Rhine conducted a series of experiments using Zener cards. It is a set of 25 numbered cards each containing a geometrical sign. They are showed to the subjects, separated by a physical obstacle from an experimenter, who then try to guess what symbol is currently presented. Many attempts had low or middle probability value but some of the test subjects showed high above average results. The distance between an experimenter and those subjects was significantly increased, for example they used Durham and Zagreb as test locations, receiving equally positive results.

Huygens was first to notice spontaneous synchronicity between two pendulum clocks. He thought phenomenon arise from transfer of mechanical waves across wooden board which makes connected devices act as one system. Since then it has been recognized as widely existing occurrence with distinguishable phase transitions: walkers on bridge, audience clapping, fireflies harmony, tidal locking, chemical self-organization (crystallization, molecular self-assembly or oscillating reactions).

Lee Smolin suggested that large scale structures of the Universe can be result of self-organization...

Idea how inner dynamics of a system can make it rearrange dates back to

ancient philosophers Democritus and Lucretius, atomists, who believed that with enough time order can emerge by itself. Further discussed by René Descartes and Immanuel Kant, this proposition was later opposed by 2nd law of thermodynamics which states that system cannot spontaneously increase its order.

Maybe it is a two-way street? From chaos to equilibrium and reverse. Examples in everyday life are numerous: things suddenly escalate from a spark while blazing fire eventually burns out. Throw rock in a pond and you will create ripples. Wait shortly and water will calm.

Chaos theory explores predictability of dynamical systems, concentrating its attention on basic framework, pathways, junctions, enhanced iteration, fractality and autocontrol, emphasizing significance of the starting provision. Dominoes and butterfly wings effects are popular examples how little events one by one unfold with time, exponentialize and pile up causing huge consequences of proportions unimaginable earlier, tornadoes. As Lao Tsu said, "the longest journey starts with the first step".

Hence, seemingly acausal synchronicity could be explained by means of chaos theory. You just have to look deep enough and connect all the pieces.

What is Time?

Time phenomenon is the most interesting issue I can think of since it is one of the reality fundamentals, one of the very essentials of the Nature. Without Time nothing is possible. With Time... Everything is possible. All goes and it did. Yet... Does Time exist or is it just an illusion?

There is General Time (GT) - straight line from the point of initial singularity to an edge of the Universe but not following the geometry of spacetime. This value also represents an age of the Universe and can be referred to as

standard. Then there are local times (loT) valid only in particular areas, like vicinity and interior of heavy objects, where spacetime curves causing deviation from the standard. Third type are individual durations associated with particular events such as transformation, moving or decay.

If Universe stop expanding General Time will continue to exist but it will further rely solely on individual durations until all cools to an absolute zero when everything, including Time, gets frozen. If Universe start contracting General Time will not count backwards. It will go on until everything returns into initial singularity when everything, including Time, loses meaning.

Arrow of Time is direction in which time flows. In what direction do you imagine time flows? Left to right, right to left or...?

Western coordinate system reveals an answer: values ascend from left side to the right. Also, look at Western analogue clock where numbers are distributed from left to right. It seems like time flows from left to right. Why?

Because in Western world people have adopted "left to right" writing pattern. Accordingly, their perception of time direction is equivalent: from left to right. Our minds are customised in such manner. We have selected specific writing pattern and attributed it to the time flow direction also. Very practical but it doesn`t mean that it is correct just because we have selected it. We could have selected otherwise.

Chinese and Hebrews are using "right to left" writing pattern. There are languages or dialects using "up to down" or "down to up" writing pattern. Every script composition has its respective writing pattern but it doesn`t mean they correlate the time flow accordingly. For practical purpose, left to right is adopted as norm worldwide.

Modern clocks are digital: adding time unit on the top of an existing bundle

but also reseting every 24 hours, regardless of the system used: 12 AM / PM or 24.

Humans have inner clock (circadian rhythm) reseting every 24 hours.

Moon resets every 33 years. It is called the lunar solar cycle.

Solar cycle, Schwabe cycle, is a period of eleven (11) years when Sun resets switching its magnetic poles and completing the Hale round, double Schwabe, after the switch has been returned to an original position. 10 1 10 1. Do I see a binary code in nature of the reality?

Do I see an error correction instructions on the cosmic level?

Universe is a big watch with every part being smaller watch. The system is monitored and balanced not only from up to down but also in reverse. Head is looking at tail and tail tickles face creating perfect equilibrium, an ultimate harmony, the divine unison.

Nothing lasted forever but couldn`t last any longer and phase transitioned into an initial singularity. It was when Time started to flow taking away from an eternity until forever returning back to nothingness without any interest rate at all.

The clock is not counting from left to right, from up to down or reverse. An arrow of time has no specific direction. By having no specific direction it flows in every possible direction. It is just counting and re-counting. When this Universe dissolves becoming Nothing again the cosmic clock will reset and start counting again.

The Time spills in itself and back out driven by the constant energy transformation. Hence, energy is the key... Defined by current entropy status.

Entropy is a degree of disorder in the system. Law of thermodynamics say it irreversibly follows an arrow of time: the more time passes the bigger is an entropy.

What is now (present moment) if not current universal entropy status immediately changing into sequential configuration thus creating an illusion of the time flow? Like series of images that listed in a succession perform seemingly uninterrupted progression.

If we change an entropy of isolated system will we change an arrow of time as well?

Space is of vector nature having three metrical dimensions, time is of scalar nature having only one temporal dimension. Meaning, space has value and direction. We can point to any place specifically and precisely. Time has value but lacks direction yet it permeates things.

Of course, because we look from the space perspective.

Imagine looking from the Time perspective. Then scalar turns into (bi)vector, (tri)vector into scalar.

Master the time. Really, master the time. Become faster and more efficient in what you do. Human brain has ability to elongate time during crisis. Then our mind double fires! Why don`t we train ourselves to regularly double fire and then quadruple during the crisis?

Because we neglect our mind on daily basis. People use their brain less and less with each passing day. Forget remote control, we are even developing artificial intelligence to think instead of us.

What is the result?

We will not remember the time anymore.

When we forget time... We forget who we are and what are our responsibilities as the most intelligent specie on Earth. We must protect not destroy Gaia!

For a long time people have tied the basic temporal unit, second, with Earth`s rotation. Before that, for thousands of years, astronomy (movement of the celestial bodies) was used as a template.

Then humanity switched to Cesium atomic clock defining one second as a time needed for the Cesium-133 atom doing exactly 9,192,631,770 oscillations not gaining nor losing a second in more than 100 million years (NIST-F1 Cesium Fountain Atomic Clock).

Nowadays, there are even more precise atomic clocks such as "Ytterbium Lattice Clock (YbLC)".

We measure Time using frequency.

Thus, time is an illusion of the flow, consequence of an energy transformation, frequency at which reality resonates, inextricably tied to underlying base.

Initial singularity wavelenght was or near zero (0), having absolute density and absolute frequency. With expansion of the Universe wavelenght increased while frequency decreased. An end of the spacetime is where wavelenght becomes straight line (infinite) and frequency zero (0) or near it.

Time is an oscillation of matter and energy, a radioactive decay of the particles.

We can learn to shape Time as we learned to shape clay.

Time paradoxes

To clarify at the start: I approach every issue objectively and let an evidence lead me to the truth not the other way around.

I am aware that my, human, brain is not evolved enough to sense the time dimension as we sense the physical dimensions. Besides, there are certainly knowledges and technologies far beyond our current understanding.

Past, present and future are now, meaning Time is an illusion, a transition point, infinitesimally thin line between before and afterwards, transformator.

Hypothetically, if somehow the Time travel could be achieved an important question are related paradoxes.

People posed this paradox in a different forms but with the same problem: if you go back in time, visit the past and arrange that your parents never met and conceived you then you will, as a consequence, immediately seize to

exist? You will promptly vanish into an obscurity like you never was?

Time could be flexible branching as a tree.

You will continue to exist in your separate time branch.

You will never be conceived in the present.

Every time travel creates new stream.

The result are parallel worlds co-existing simultaneously in a different Time branches.

That is how I imagine the Time: as a tree. There is a main part, General Time, out of which numerous fragments divide and subdivide on their own but are always connected to the substance.

Everything is tied.

Let us move a step further in the Time travel paradox.

Someone else could come, maybe you from another reality, and stop the arrangement being done after it was done. Will that make you appear again like you never disappeared? In this present Time branch, third, yes. In the former, second, you are gone. In the first you exist.

Perhapse... You could be your father? Or your mother in case you are female.

Or both if you change sex... Meaning that you are all three: you could be your father and your mother and their offspring. Imagine this triangle: you are your parents and their child. You alone arranged your conception by traveling through the Time. You alone are the origin of yourself.

Is it really possible to create yourself, by using the Time travel phenomenon, out of nothing?

If so it is called the temporal knot.

There is an excellent Netflix tv serie called the Dark.

Now imagine an ultimate time travel paradox: by using the high energy lasers, in the future, people have created the Big Bang - in the past. We ourselves, humans, could be the Origin of this Universe.

There is an interpretation how Universe can level any paradox. It simply accommodates arising issues by using built-in error correcting codes.

Beside creation of a separate temporal branch, I have thought of second plausible solution in case there is no chronological diversity: annihilation could be a process corresponding to the time travelers age - not immediate response to cause removal. Meaning, if you somehow go back in the past and stop your parents from conceiving you then you will not seize to be right that moment. Embryo will never be conceived and with each passing moment yourself will bygone equivalently. You will never get obliviated because of removing the cause of your existence. Your past will start disappearing together with your memories. You will continue to live but continuously forgetting everything you experienced and learned until preventing your birth to occur from which moment on only new formed memories will occupy your brain cells. Traces of your existence will steadily vanish and eventually no one will remember who you are. Not even yourself.

Of course, simplest solution is an instant extinction but I am always trying to look beyond straightforward models.

There is a paradox-free interpretation, suggested by physicists at University of Queensland, proposing that whatever we do the Universe will straighten any anomaly. Similar concept already existed in the form of Igor Novikov`s Self-Consistency Principle.

Time travel

Science say the Time and frequency are inversely proportional.

$$f = 1 / T$$

$$T = 1 / f$$

Are really the Time and frequency inversely proportional?

Or...

$$f = 1 / pT$$

$$pT = 1 / f$$

f - how many waves will pass a given point in a second

pT - period of Time

For example, if waves of something pass 5 times through a given point in a second we say the frequency of that something is 5 Hz.

Using formula pT = 1 / f we get 0.2 sec result for the Time period.

Therefore, period of Time is an inversely proportional to a frequency. Not Time itself. Time is sum of all related periods.

T = pT1 + pT2 ... + pTn

Max Planck formulated an equation relating energy (E) and frequency (f):

E = h x f

h - Planck`s constant

f - frequency

Let us join two equations and relate Time with energy.

E = h x 1 / T ... x T (multiply both sides with T)

E x T = h ... /E (divide both sides with E)

T = h / E

h = 6.62607015 x 10−34 Js (Joule second)

or

$4.135667696 \times 10^{-15}$ eV/Hz

Time is counteracted by an energy level - increasing an energy we lower the Time! It is like a playground seesaw: when energy is maximized time is minuscule, almost insignificant for photon traveling at the speed of light. Inversely, when moving object slows down it starts experiencing time more closely. When its speed reaches zero time becomes extremely elongated.

Without an energy there is no Time.

By increasing an energy we lower the Time!

How do we increase an energy level? Well, the faster an object moves the greater kinetic energy it possess.

Ek = 1/2 m x v`2

Notice that the kinetic energy increases with the speed squared, meaning an object with a double speed has four times bigger kinetic energy. Meaning, the speed is more significant contributor than mass.

Remember formula T = h / E from earlier?

Now we replace E with expression 1/2 m x v`2 and get:

T = h / 1/2 m x v`2 or T = 2h / m x v`2

When we reach the critical velocity, resulting in maximal energy level sustainable by associated field, being it quantum or whatever, Time will drop to zero (0) value. For us, Time will stop. For the rest of the Universe, Time will continue at usual pace. Longer or faster we move at the critical velocity more we travel into the future. But even small increase in speed produces time delay although practically unnoticeable one and the system, to which we belong, promptly stabilizes itself. To profit from the relativity we must astronomically distance ourselves.

To travel into the past we have to invert an energy into its negative counterpart either by modulating frequency or by using an anti-matter as a fuel source. Anti-matter gives anti-energy.

Time is a consequence of an energy transformation.

We use specific amount of energy to define one second (1 sec). We say that 0.000038 eV or 6.09×10`-24 J is one second (1 sec).

E = h x f = 6.62607015 ×10`-34 kg m2 / s x 9,192,631,770 Hz = 6 x 10`-24 kg m2 / s2 (Nm or J) = 6 x 10`-24 x 6.242 x 10`18 eV = 37.5 x 10`-6 eV = 3.75 x 10`-5 eV = 0.0000375 eV = 6.09 × 10`-24 J

We just use another terminology for an energy transformation - we call it Time.

To conclude, high energy physics is the most promising solution for the Time Travel.

Can we arrive sooner than before?

Muons, products of cosmic rays and atmosphere particles collision, reach the Earth because they travel near the speed of light which causes their inner clocks to slow down. Meaning, Time is indeed relative, depending on the speed of a motion which directly influences amount of kinetic energy related object has.

In 1971. astronomer Bolton decided to determine the mass of, what was thought to be, a neutron star Cygnus X-1 belonging to the binary system, where two cosmic objects rotate each other, some 8000 ly away from Earth.

The result was stunning.

Mass of the Cygnus X-1 was much above scientific predictions: approx. ten (10) solar masses. How could that be?

Well, it wasn`t a neutron star. It was... The black hole. First discovered.

According to Einstein, very strong gravity slows down time same as moving at the very fast speed.

At 27km long LHC, under Geneva, scientists are colliding particles creating high energies which tear fabric of spacetime creating "wormholes". By using lasers "wormholes" can be stabilized after which, theoretically, an application of the negative energy, discovered by Dutch physicist Casimir in 1948., can make them traversable. Casimir force becomes predominant at distances below a micrometre (μm). At 10 nm it produces pressure equivalent to 1 atm (one atmosphere).

Hubble observed the Doppler effect in a distant galaxies. By measuring the redshift he discovered that some galaxies are moving away and some move

closer to each other. Furthermore, Hubble discovered that the Universe is expanding.

Supernova (standard candles) research revealed that the Universe expansion is accelerating.

Galaxies moving faster than ours experience time flow slower. That circumstance gives them incredible advantage over us. Observer`s position is inextricably related to the relativity phenomenon. Essentially, looking from the side, General Time passes equally for all. Specifically, each of us sense time flow accordingly to their movement speed. An outside observer sees astronaut falling into a black hole. For astronaut time is dilated, due to the velocity of motion, and he experiences the fall for ages. Ultimately, black hole shreds poor fellow into bits, drives around pieces, squeezes, compresses`em and then spits. All matter and energy zipped into a single spatial unit heavily violating the Pauli exclusion principle.

Galaxies moving faster than the speed of light are not affected by the time flow. Instead, they could be continuously traveling in the future. Ancient beings living there could be almost old as the Universe but haven`t aged a bit since. These cosmic Elders are keepers of the Truth.

Can we arrive sooner than before? Judging by mentioned above it seems that we can. But let us dive even deeper...

Temporal transfer

Temporal transfer, colloquially known as time travel, is a scientific procedure used to move from one point in chronological order to another, before or after starting position.

In his theory of special relativity, A. Einstein discovered very interesting phenomenon called time dilation meaning that moving clocks tick slower than stationary ones. In theory of general relativity, he predicted that clocks placed closer to the gravitational source will tick slower compared to a distant ones. Both predictions has been experimentally confirmed using GPS satellites: difference is observable but small. During 24 hours period, clocks on satellites tick 0,000007 seconds (7 microseconds) slower than ground ones but actual time dilation is 0.000038 seconds (38 microseconds) in favour of ground clocks. Enough to disrupt delicate positioning and communication systems, which requires regular synchronization, but insufficient for noticeable time travel effect. However, using much stronger gravitational pull, like found in the vicinity of a black holes, time travel to future is possible - as seen in the movie Interstellar.

Let us briefly dwell into the physics envisioned by Kip Thorne: main actor flies with spaceship "Endurance" to fictional supermassive black hole named Gargantua, having a 100 million solar masses and rotating at 99.8% speed of the light. I argue that it is not the black hole itself which rotates but rather its accretion disc. Anyway, Gargantua`s enormous gravitational pull makes surrounding objects to accelerate at 55% of C (planet) and 1/3 of C (spaceship) while maintaining stable orbits. This effect results in time moving slower for protagonists, compared to the time passage on Earth, which consequently makes them travel to the future.

Another type of experiment, that proves theory of relativity, relies on very precise atomic clocks in which Strontium atoms are trapped inside lattice structure produced by laser beams. Scientists measure frequency change between higher and lower levels of entrapment just millimeter apart from each other. Regardless of miniature redshift value, on 10`-19 scale, results confirm Einstein`s prediction. Improved experimental models will enable us to observe waves superposition and explore quantum coherence states.

What are the properties of time?

It permeates and affects everything just like dark energy which makes me

think that time is also a form of energy, maybe even dark energy itself. Locally, under gravitational influence and present acceleration, it has relativistic nature. Generally, from the moment of the Big Bang to a current cosmic border, it has universal value corresponding to an age of the Universe or approx. 13.8 billion years (multiplied with actual size some propose to be 250x bigger).

What forms of energy exist? Kinetic (including thermal), potential (either mechanical or chemical), electromagnetic, gravitational, nuclear, radiant and vacuum. Maybe temporal as well?

Day and night are human made concepts - Sun shines all the time.

Humans could be the Universe creator, and destroyer, themselves. Sometime in the future, when science sufficiently advances, mankind will be able to break spacetime fabric apart, using grand unification energy, possibly gaving birth to the Big Bang in the past and maybe sealing their own fate as well.

Time dilation is achievable by increasing any form of energy not only kinetic. For example, vicinity of nuclear reactors could cause temporal desynchronization.

Light

Human eyes formed as to constantly render the Universe. Black middle resembles the primordial hot plasma stage, when photons couldn`t yet freely travel around, while colourful surroundings, Iris, portray the Cosmos itself.

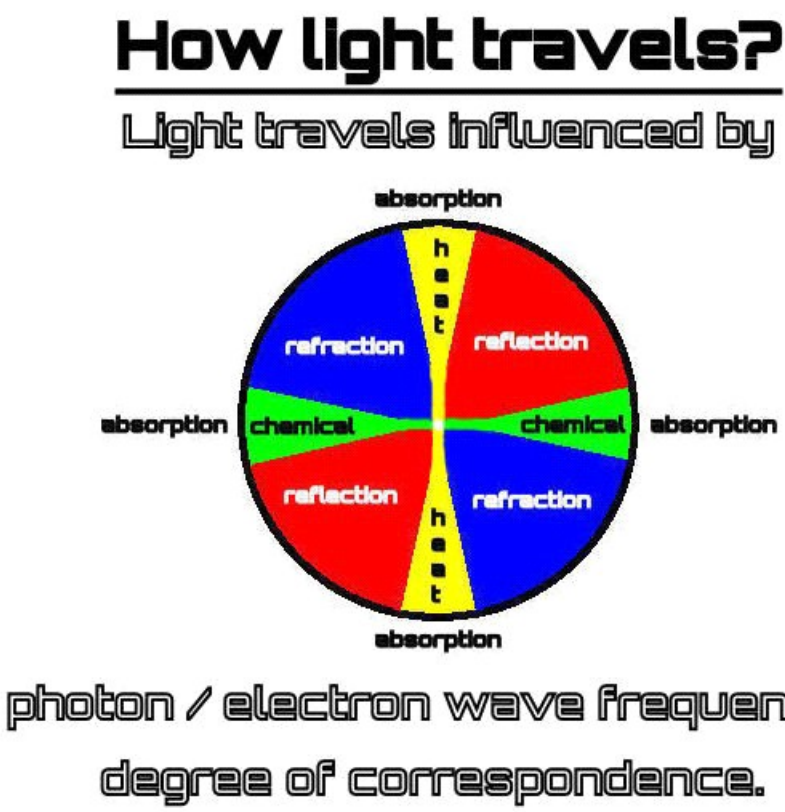
Being part of an electromagnetic spectrum, light is the most important sense humans use to gather informations from their environment. Without it, or

with restricted eyesight ability, species adapted other means of perception - those in deep seas or underground, where there is little or none sunlight, evolved larger eyes, improved feelings of sound / smell / taste, body hair transformed into the receptors, fattened skin and intensified reception of an ambient vibrations.

What is light and how it travels?

When I browsed "how photon (or light) travels" I constantly received this reply: "because of the low air density". I haven`t asked that.

How photon (or light) travels? Because of the frequency coherence between a photon and an electron: if their waves correspond then photon passes through the medium (material) more or less refracting depending on the level of the synchronicity, angle of arrival and due to an electron orbital transition caused by related excitation. If frequencies do not match then photon gets reflected of the surface of the medium (material) which depends on the level of decoherence. Third possibility is an absorption: thermodynamical transformation of the light quanta in black or dense objects or chemical integration (Chlorophyll in the green plants).



Why are leafs green? Because chlorophylls are absorpting red and blue light spectrum while reflecting green part. They absorb the light through the process called photosynthesis which is actually a merging of red and blue waves into the chemical compounds (carbohydrate molecules). It allows plants to use 1% of an incoming sunlight.

The light is just a visible part of an EM spectrum and the smallest one which means that humans can only see tiny bit of the whole picture.

Heinrich Rudolf Hertz first proved existence of an electromagnetic waves theoretically postulated by James Clerk Maxwell in his equations of electromagnetism.

There is a religious misconception that the Light was created by God for

humans to see. No, we developed eyes, ability to see, in the course of an evolution, to use already existing light.

Electromagnetic radiation is created during nuclear reactions, either of stellar or artificial origin.

Related terminology:

Photometry - is measurement of light regarding brightness perceived in human eye or luminous flux (distinct from radiant flux). Device used for this kind of measuring is called photometer.

Lumen (lm) - is the SI unit of a luminous flux.

Illuminance is total luminous flux per surface of an area.

SI unit is lux (lx) equalling to one lumen (1 lm) per square meter (m2).

1 lx = 1 lm/m2

Illuminance intensity is luminous flux per unit of a solid angle. It is expressed by SI unit Candela (cd).

1 cd = 1 lm / 1 sr

To understand Steradian let us remember what is Radian (rad). Radian is an angle of a triangle, drawn from the center of a circle, having arc lenght

(opposing side) same as radius. 360 degrees equals 2pi radians.

Steradian (sr) is a 3d analogue of radian but instead of triangle in circle we draw right circular cone from the center of a sphere (apex). Ratio of projected area surface and sphere's radius square equals respected angular value.

Solid angle (symbol: Ω) is field of view measure.

$\Omega = A / r2$

A - area surface

r - radius of sphere

In case of plane cone base we use spherical cap area surface or $2\pi rh$.

$\Omega = 2\pi rh / r2 = 2\pi h / r$

Visible range of an electromagnetic spectrum is between approx. 400 and 700 nm, divided into following colours:

Red: 665 nm

Orange: 630 nm

Yellow: 600 nm

Green: 550 nm

Blue: 470 nm

Indigo: 425 nm

Violet: 400 nm

Black holes

As explained by Oppenheimer and Snyder in their 1939. paper about collapse of a dust cloud, titled "On Continued Gravitational Contraction", in absence of an internal pressure and due to energy exhaustion gravity starts to compress matter. Several effects can be observed: time dilation, redshift and light deflection. Finally, only "thing" that remains is a gravitational field so strong not even massless particles traveling at the speed of light can escape its deadly clutch.

In 1958. David Finkelstein described "an unidirectional membrane". Initially calling it “gravitationally completely collapsed object", John Archibald Wheeler switched to the term black hole as suggested by unknown member of an audience during one of Wheeler`s lectures back in 1967.

Year after Alfred Einstein released his famous field equations in 1915., Karl Schwarzschild calculated the solution for a non-rotating ideal sphere. Results went insane reaching the central point where spacetime curvature and matter density become infinite. This tiny dot called singularity was known to mathematicians, such as Cauchy, Riemann and Poincare, earlier and even before as James Clerk Maxwell in 1873. defined characteristics of a singularity: instability, system correspondence, particularity, irreversibility, non-objectivity, randomness, complexity and interactivity but its existence in reality was unimaginable until Penrose and Hawking released their singularity theorems. Even Einstein claimed that Schwarzschild singularities aren`t actually possible.

Stephen Hawking said that diverging (expanding) Universe must have been converged in the beginning, likewise, it must had singularity although it differs from black hole`s one mainly because quantum gravity is assimetrical

with time progress. Furthermore, Hawking proposes that special sort of thermal radiation enables black holes to eventually evaporate.

Since event horizon is an edge of the black hole, does quantum tunelling play a role in Hawking radiation?

Expressed by Bekenstein–Hawking formula, according to the 2nd law of thermodynamics, black holes also have entropy and it is proportional to the surface size of its event horizon. Almost all cosmic entropy is inside black holes.

Despite opinion shared by many scientists that perfect physical symmetry is needed for collapsing matter to form a black hole, with singularity in its middle, and that natural imperfections would prevent the process 2020. Nobel award laureateas Roger Penrose, Reinhard Genzel and Andrea Ghez proved otherwise. Alongside Penrose`s remarkable theoretical work, started more than a half century earlier, the latter two actually discovered supermassive dense body in center of the Milky Way galaxy. They called it Sagittarius A*.

Sir Roger Penrose, mathematical physicist, Cambridge PhD and emeritus professor at Oxford, found that black hole formation is a robust prediction of Albert Einstein`s General theory of relativity. Trapped surface, topological anomaly converging on both sides, reveals how locally positive energy always produces singularity in such area. Penrose proved that matter doesn`t irregularly swirl around but settles in the middle. As a consequence of expansion, last scattering surface is a transition point when photons finally decoupled and started to travel around making Universe transparent. Talking about hyperbolic geometry, Penrose makes reference to M. C. Escher art in attempt to describe how different positions in and around black hole affect an observers notion of self and immediate surroundings.

Penrose proposes Conformal Cyclical Cosmology (CCC) or sequence of mutually connected cosmic cycles, named Eons, described by Friedmann–

Lemaître–Robertson–Walker spacetime metric and preserving angles in-between. Some things like massless particles and gravitational waves can pass through an Eon barrier, which is the Big Bang itself (re-occurring), producing an observable signal in a form of temperature variances. Vahe Gurzadyan found exactly this temperature variances in Microwave Anisotropy Probe, corresponding to later Planck CMBR data, at least three concentric rings of it revealing anisotropy and inhomogeneity which have been, as explained by Penrose, supermassive black holes clusters in previous Eon.

There are three types of black holes: supermassive, stellar and non-rotating.

Supermassive black holes are remnants of ancient stars that had enormous proportions and consequently gave birth to surrounding galaxies by ejecting parts of their coronal mass. Primordial black holes belong to special category that has more than 100 billion sollar mass and originate directly from an initial hot plasma state.

Stellar black holes are leftovers of stars which burned their fuel and collapsed inwards.

Non-rotating black holes lack strong magnetic field. They could have a bundle of matter in the middle or someone has extracted the singularity. What if collapsed stars haven`t burned their fuel but it was removed by technologically advanced specie leaving us with an empty basket? Dirty thieves, they took the singularity as well! Basket is not only empty but punctured as well. Is there a civilization in our vicinity that has already achieved higher degree on the Cardashev scale exploiting black holes as the sources of tremendous energy?

Spinning black holes must have an axis of their rotation. I assume that periodical two-sided outbursts of energy, named "jets of particles", occur exactly along them maybe due to a critical power accumulation inside the singularity. Does each black hole has a limit depending on its initial size (mass) or matter and anti-matter mutually annihilate in the middle?

To become black hole after exhaustion star must be inside Tolman-Oppenheimer-Volkoff limit: 2.2 to 2.9 solar masses. If it fits the Chandrasekhar limit of about 1.4 solar mass white dwarf (degenerate stellar terminus) will instead become neutron star. I have calculated that a teaspoon of it roughly weights as Earth`s moon meaning it is approx. of 10`22 scale. Be careful when putting sugar in your coffee not to accidentally grab some neutron star or your hand will be forcefully elongated in a chewing gum manner.

Schwarzschild radius, formulated as rS = 2 x G x m / c2, determines the border of an uncharged, non-rotating, perfectly spherical object, event horizon or perimeter beyond which nothing can escape black hole`s gravitational force. For charged ones solution came soon, 1916 - 1921., in the form of Reissner–Nordström metric while it was not until 1963. and 1965. when (un)charged rotating analogous were obtained by Kerr and Kerr–Newman, respectively.

Spinning black holes are slightly distorted, a bit stretched along an axis of rotation, thus they require incorporation of an angular momentum value.

Black holes are extremely cold. Don`t forget to wear a winter clothes if you visit one! Their temperature is near an absolute zero because all energy and matter is concentrated in an ultra dense and hot center point (singularity).

Building on the previous work done by Yakov Zeldovich, Alexei Starobinsky and Jacob Bekenstein, Stephen Hawking in 1974. proposed that black holes emit thermal energy, reduce their mass with time and eventually evaporate.

Contemporary estimate is that our galaxy Milky Way contains about a hundred million black holes.

These are five (5) most relevant black holes:

Cygnus X-1 (first discovered): located some 2.2 kiloparsecs from the Earth (about 7.200 light years), it has 21 solar mass and rotates creating strong magnetic field and X-rays flux.

Gaia BH1 (nearest stellar black hole): located between 1,500 and 1,600 light-years from the Earth, it has 10 sollar mass.

Sagittarius A* (nearest supermassive black hole): located in the center of our Milky Way galaxy, in the constellation Sagittarius, approx. 26,000 ly away from the Earth. It has 4.3 million solar mass and diameter of 23.5 million kilometers.

TON 618 (heaviest black hole known): it has 66 billion solar mass and diameter of 390 billion km, approx.

Phoenix A (currently best candidate for new heaviest black hole known and even primordial one): estimated at 100 billion solar mass and having diameter of 590 billion kilometers.

Observations made by NASA’s Chandra X-ray Observatory telescope and related calculations using outflow method, developed by Ruth Daly from Penn State University, confirmed in 2023. that Sagittarius A* is rotating and producing Lense-Thirring effect, a.k.a. frame dragging, one of phenomenons predicted by Albert Einstein’s Theory of General relativity. According to the latter, massive rotating cosmic objects not only bend but also distort and pull spacetime around which fact has crucial influence on surrounding accretion disk (diffuse material circling a black hole).

Energy, force and waves

To break a myth on a very start: energy is not created only converted for the time being. If it could be created that would be groundbreaking success in physics, enabling us to harvest free power, game changer moving us one significant step closer in explaining the Universe origin. Therefore, I find terms "generator", "generate", "create", "produce" and similar not suitable for accurately describing transformation processes. However, I will use them for practical purpose.

Most interesting forms of energy are electromagnetism and nuclear power.

Electromagnetism is a widespread phenomenon mostly forming as stellar radiation, ranging from radio to gamma part of spectrum, or change in magnetic fields but also produced by artifical means like windmills, hydroelectric power plants or nuclear facilities and intrinsic to materials such as permanent magnets. Three forementioned share common concept of turbine utilization getting an electrical return from kinetic energy input made by wind, water or steam factor.

History of electromagnetism pretty much begins with Hans Christian Ørsted who, influenced with earlier studies done by Galvani and Volta, first observed that a compass needle deflects in vicinity of an electric current which he explained by new, competing magnetic field formed as a result of electric current flow. André-Marie Ampère devised theory of electromagnetism, he referred to as electrodynamics, after discovering that two conducting wires, parallel to each other, mutually attract or repulse dependent on whether electric currents in those wires have same or opposite direction and that mutual attraction or repulsion is proportional to wires lenght and related currents (Ampère's force law). Ampère also found that magnetic field created by an electric current is proportional to the current magnitude. Moreover, this proportionality is equal to the magnetic permeability of free space constant (μo).

Einstein-de Haas effect experimentally confirmed Ampère`s theory showing

that by reversing electrons alignment in ferromagnets, through utilization of an external magnetic field, mechanical angular momentum can be achieved. This was extension of William Crooke`s revelation how radiometer vanes rotate being exposed to light or mere heat. Seemingly due to the pressure of light as Crooke thought, dark sides went back and light sides moved forward. Further experiments done by Arthur Schuster and Pyotr Lebedev, respectively, excluded pressure of light as reason for vanes movement because vanes were motionless in a vacuum while in a case of partial vacuum they should move in opposite direction since photons would exert more force on the reflecting side (light) than on absorbing one (black). Accepted explanation is given by Osborne Reynolds who proposed that temperature difference causes thermal diffusion and thus Crooke`s radiometer functions as a heat engine where difference in temperature becomes converted into a mechanical drive. Technology developed by NASA in 70`s proved that pressure of light (solar radiation) can indeed produce an effect but significantly wide and thin sails must be used in order to receive enough momentum from incoming photons.

Michael Faraday developed first generator in 1831. Usually called Faraday disc, wheel or dynamo it converts kinetic (energy of motion) to electric energy. Faraday discovered that an electromotive force (emf) manifests over the conductor as a result of change in magnetic flux (ΦB) and perpendicular to it. According to his law of an electromagnetic induction, emf equals - d ΦB / d t where negative sign is due to Lenz`s law which defines reverse direction of magnetic field and mechanical force exerted by induced current produced as a result of a change in an initial magnetic field. Faraday`s invention has certain flaws such as use of static field and direct current, low voltage outcome and counterflow. Although latter can be corrected with an array of magnets, this approach was not further exploited but replaced with commutators and alternators. Nikola Tesla patented an improved commutator version, named "Dynamo Electric Machine", constructed of iron disks of various diameters which increased efficiency is achieved by reducing power loss occurring due to the Foucault`s currents.

Essentially speaking, when magnet or conductor are moved against each other an electromotive force is manifested and electric current starts to flow through the connected wire (coil). Reverse conversion is also possible: it is

done by an electric motor.

Technically, we are using an angular momentum of the rotor, placed inside a magnetic field, to produce Lorentz force formulated as F = q (E + v B) where q stands for particle`s charge, v for particle`s velocity, E for an electric field and B for magnetic field strenght.

James Clerk Maxwell's differential equations are staple in theory of electromagnetism providing mathematical frame for earlier Faraday`s experimental work. It was Maxwell who first explained light as propagating electromagnetic wave and predicted EM radiation which was later confirmed by Heinrich Hertz (radio), Wilhelm Röntgen (X-rays) and Ernest Rutherford (gamma) while infrared part was already known to William Herschel in 1800. who detected an invisible beams causing heat.

Use of electromagnetic force found its application in railgun research for launching high-velocity projectiles carrying huge kinetic energy.

According to NOAA (National Oceanic and Atmospheric Administration), lightning is an unpredictable force of nature and we are not yet able to forecast when and where it will strike. In turbulent thunderstorm environment, bipolarization of electric charge happens because electrons are taken from ascending particles and accumulated in the bottom of a storm cloud (Cumulonimbus) thus generating electric field. Since atmosphere acts as an insulator, huge amount of charge is needed for lightning to overcome resistance and strike Earth`s surface attracted by positive charge within it. Negative charge from the bottom of a cloud and positive charge from the surface, or some higher structure, create channels for their transfer. Sound of thunder is the consequence of an adjacent air being pushed away faster than the speed of sound (sonic boom). Meeting of two opposite charges trigger the lighting which actually travels upward. A single flash can have one or more strokes (record is 47). However, most of phenomenon occurs inside a storm cloud where electrons travel up. I think that lighting happens according to the Faraday`s law of an electromagnetic induction because cloud (conductor) is moving inside geomagnetic field while according to the

Lenz`s law current has reversed direction. Change in a magnetic flux is directed aside while negative charge, electrons flow perpendicular (downwards toward the surface) escorted with mechanical force opposing the motion. Cloud`s electric field is vertically positioned. Hence, charge travels vertically.

Electric current can be induced statically by rearrangement of the charge (separation in positive and negative pole). If differently charged objects get close to each other they can cause an electrostatic induction or an electrostatic discharge, described with triboelectric effect, may occur as the consequence of an imbalance in charge distribution. Gaining momentum attributed potential decreases transforming into a kinetic energy.

Piezoelectricity is property of certain materials which induce current influenced by mechanical stress (pressure).

Ampere (A, amp) is the SI unit for electric current. One ampere is defined as equal to 1 C per second. 1 A = 1 C / sec

Coulomb (C) is the SI unit for electric charge. One coulomb is defined as equal to 1 A per second. 1 C = 1 A / sec

Volt (V) is the SI unit for electric potential, electric potential difference and electromotive force. One volt is defined as equal to 1 W per 1 A (quotient of power and current) or product of 1 A and 1 Ω (current and resistance multiplied).

Ohm (Ω, ohm) is the SI unit of electrical resistance. One ohm is defined as equal to 1 V per 1 A. 1 Ω = 1 V / 1 A

Radiant flux is amount of radiant energy. Device that measures power of an

electromagnetic radiation is called radiometer.

SI unit of radiant flux is one Watt (W). 1 W = J/s

Nuclear energy is precursor for an electromagnetic radiation. It can be natural, occurring in stars, or artificial, produced in nuclear power plants where reactions, either fission or fusion, create extreme heat which causes surrounding water to boil and steam moves turbine producing electrical power.

Inside nuclear fission reactor, fuel rods made of Uranium-235 are submerged in water to enable neutron absorption by slowing them down. Same water also acts as a reactor coolant but its main purpose is to move turbines and thus create electricity.

n0 + 235U --> 236U --> 92Kr + 141Ba + 3 n0 + 200 MeV

Other results are also possible. For example,

n0 + 235U --> 144Xe + 90Sr + 2 n0 +200 MeV

Since nuclear fusion has many advantages over fission like reduced radioactivity, less nuclear waste and higher energy output, International Fusion Energy Project is working on a tokamak fusion reactor which will use Deuterium and Tritium as the fuel. Hydrogen gas in toroidal chamber is ionized with electrical current and resulting plasma contained by magnetic fields. Walls surrounding reactor are made of Lithium which captures neutrons unaffected by containment due to their electrical neutrality. It is worth to mention that plasma, being electrically charged, generates own magnetic field. When temperature reaches 150 million degrees °C fusion becomes enabled. In dust clouds, 15 million degrees °C is enough to produce

a protostar owing to pressure caused by gravity and even quantum tunneling. Our Sun core temperature is just about that. If there is available material in surrounding nebula star will continue to grow until Iron starts to configure and absorb energy which will be released in the Supernova explosion burning at billion degrees Celsius. Blue stars, hottest type in the Universe, can reach 100 million degrees °C. Such extreme heat is needed for strong force to overcome electrostatic force, in other words, to pass atomic stability barrier defined by Coulomb's inverse-square law formulated as F = k q1q2 / r2 where k is Coulomb`s constant, q1 and q2 are charge values and r is a distance between them.

2H + 3H --> 4He + n0 + 17.6 MeV of which 14.1 MeV becomes kinetic energy of the neutron released.

Where does nuclear energy originate? Very likely in chemical bonds between atoms. When you separate atoms their bonds are freed and energy released.

There is a form of energy called thermal: kinetic energy of particles, vibrating, rotating and moving through space. Heat is thermal energy transfer between systems or bodies due to a temperature, value of an average particles kinetic energy in a determined substance, difference. Simply put, heat is an energy in transfer.

Heat can have convective stream (flow internally), conductive path (movement of a fluid itself within the system) or radiate (infrared waves emitted outside of the system).

Most important concept in thermodynamics is the state of thermal equilibrium describing no thermal energy exchange between related physical systems. In case od temperature difference, 2nd law of thermodynamics applies until entropy balance is achieved.

Particles at rest possess potential (chemical) energy or chemical potential. It can be advanced into kinetic energy, under application of external force, or used as nuclear reactor fuel after satisfying mandatory criteria.

Acoustic energy is sound wave caused pressure exhibited through the structure of matter or medium where speed and quality of transmission depend on object`s density and elasticity. Sound is amplified by positive wave interference while negative produces degradation.

$v = \sqrt{(\eta/\rho)}$

η - elasticity

ρ - density

General formula for the speed of sound in a medium is given by Newton`s equation $v = \sqrt{(P/\rho)}$ where P (pressure) should be confronted with an adiabatic index (Laplace correction) thus written as bulk modulus of air, denoted by symbol B.

$B = \gamma P$

γ is adiabatic index

Mechanical energy is defined as sum of potential energy and kinetic energy.

$E_{mech} = U + K$

U - potential energy (in case of gravitation it is equal to product of weight

and height, U = W h)

K - kinetic energy

SI unit for energy is one Joule (J)

1 J = N x m = W x s = 1 kg x m2 / s2

SI unit for force is one Newton (N)

1 N = 1 kg x m / s2

SI unit for radiant power is Watt (W)

1 W = 1 J / s = 1 N x m / s = 1 kg x m2 / s3

Deployment of energy releases force when particles configuration, vibration and rotation or motion transform to a boson state characterized as wave function: vigorous energy becomes force to reckon with.

Wave function is the mathematical description of a quantum state, denoted with symbol Ψ (psi), relating position of an electron (three variables x, y, z), time (t) and associated energy (wave amplitude).

First who discussed particle-wave duality was Louis de Broglie winning Nobel prize in 1929. “for his discovery of the wave nature of electrons”.

Physicists at MIT, led by Riccardo Comin, trapped electrons in synthesized pyrochlore mineral crystal, produced by melting together then cooling Calcium and Nickel, having kagome style arrangement of atoms and attaining the same energy level. In 2025. using angle-resolved photoemission spectroscopy (ARPES), quantum geometry of electrons was detected for the first time: until then we could only make statistical

predictions of position and velocity. Now we have better understanding of an electron`s structure.

There are two types of waves, transverse (perpendicular) and longitudinal, both characterized by compression and rarefaction.

Electron and photon both act as a particle and a wave which is shown by the double slit experiment.

Particle is a tiny, dot like object that has multiple properties such as volume, density, mass, atomic number, spin, charge but it can not occupy the same position in space as other particle. To do that it must become a wave. Waves can neutralise, interfere or amplify.

Wave is pulsating or linearly spreading activity which has two main characterics: lenght and frequency.

Wavelenght is a distance between two corresponding points on consecutive, adjacent oscillation.

Frequency is an amount of wave reoccurrences at the same point.

SI unit for the frequency is Hertz (Hz). It equals one event per second:

$f = 1 / T$

$1 \text{ Hz} = 1 / \text{sec}$

In order for waves to travel there must be underlying medium or field.

When passing from one medium to another, Snell's law relates angles of incidence and refraction as their sine values ratio. Same dimensionless quantity can also be presented as ratio of the speed of light in vacuum and the speed of light in propagating medium.

$\sin \angle 1 / \sin \angle 2 = n = c / v$

n - refractive index

"There is no such thing as the straight line in nature"... From ancient view proposed by Hero of Alexandria that light takes path of the shortest possible lenght, through classical mechanics, described in Newton`s laws of motion, and Fermat's principle, rule of lowest time which turned out to be a special case, Johann Bernoulli suggested in 1696., the curve of a fastest descent is an arc of the cycloid while Leonhard Euler extended previous work but it was not until William Rowan Hamilton who stated that an actual path taken by a system transitioning from one state to another is exactly the one that minimises the difference between kinetic and potential energy thus incorporating Lagrangian function into his principle of a stationary action having zero variation in respect to time ($\delta S = 0$)... to the Copenhagen interpretation, Schrödinger equation (see chapter about Quantum physics) and Richard Feynman`s path integral formulation.

Hamilton`s principle

$\delta \mathcal{S} = \delta \int_{t1}^{t2} L(qt)\, dt = 0$

$\mathcal{S}$ is the action

δ - variation

t2-t1 starting and ending time

L is Lagrangian of a system: difference between kinetic and potential energy (Ek - Ep)

Among infinite number of possible trajectories system can take between two temporal points the one that makes an action integral stationary (not changing) will be the one followed.

Principle of least action can be modified for application in field dynamics.

Einstein–Hilbert action, basic concept in general relativity, enables derivation of the Einstein's field equations describing influence of matter and energy over the curvature of spacetime.

Wave function collapse occurs as the consequence of an observation when specific state is reduced from superposition to a single determinated fixed value.

Quantum decoherence is a degradation of the system, which undergoes transition to the classical mode, happening due to its interaction with an environment.

Bose-Einstein condensate (BEC) is an extreme state of matter, exhibiting exotic behaviours like superfluidity and superposition, taking place when atoms are cooled near an absolute zero temperature (-273.15°C).

Cosmic anthropology

To get an impression of the "history of mankind to Universe" ratio I decided

to display both chronologies on a same timeline:

Age of the Universe ((observable part): 13.8 billion years

Planck epoch: 10`-43 s

Inflation: 10`-32 s

For a comparison, blink of human eye is 10`-1 s.

Cosmic neutrino background (CNB) : 1 s

Early Universe: first 370.000 years

Dark matter: first 200 million years

Primordial stars and galaxies formation: 200 to 500 million years

Cosmic dark era: first 1 billion years

HD 140283 (Methuselah star): 14.5 billion years (+- 0.8 billion years); 13.7 billion years

Milky Way: 13.6 billion years

Andromeda galaxy: 10 billion years

Sun: 4.5 billion years

Earth: 4.5 billion years

Life: 3.7 billion years (single cell Eukaryotes and Prokaryotes)

Cyanobacteria: 3.5 billion years (photosynthesis, Oxygen)

Green algae: 850 million years

Multicellular sponge: 700 million years

Cambrian explosion: 530 million years ago (Trilobites - primordial Arthropods)

Plants (land): 460 million years

Turtles: 260 million years

Mammals: 210-225 million years

Primates: 55-90 million years

Homo habilis ("handy man"): 2.4 - 1.5 million years

Homo erectus ("standing man"): 2 million years

Homo sapiens ("wise man"): 300,000 years

Migration from Africa: 50,000 to 70,000 years

Neolithic revolution: around 10,000 BCE (development of agriculture)

Emergence of Sumerian, Egyptian, Iranian, Peruvian, Mesoamerican, Minoan, South Asian and Chinese cultures: 5.000 to 3.000 BCE

Oldest writings (Kish tablet): 3500 years BCE, Sumer, Mesopotamia. Written in proto-cuneiform. Not yet deciphered.

Epic of Gilgamesh: 2100 BCE, Sumer, Mesopotamia. Written in Akkadian cuneiform (extinct, replaced with ancient Aramaic). Immortality, flood myth.

Phaistos Disc (Minoan claywork): 1850-1600 BCE or 14th century BCE. Not yet deciphered.

Rigveda: 1500-1200 years BCE

Solomon`s Temple (First Temple): 957 years BCE

Tao Te Ching: 6th-4th century BCE

Altar of the Twelve Gods: 522.-521. BCE

Aṣṭādhyāyī (Panini): 4th century BCE

Dead Sea Scrolls: 3rd century BCE - 1st century CE

Birth of the Jesus Christ: 6-4 years BCE

Crucifixion of the Jesus Christ: 30. to 33. CE

Quran: 610. - 632. CE

Christopher Columbus first voyage: 1492. - 1493. CE

Voynich manuscript: material dates back to the15th century CE but it could have been written later. It is not yet decrypted.

Tycho Brahe observed a Supernova (SN 1572): 1572. CE

Johannes Kepler observed a Supernova (SN 1604): 1604. CE

First telescope (Hans Lippershey, Galileo Galilei): 1608.-1609. CE

"Philosophiæ Naturalis Principia Mathematica" (Isaac Newton): first published 1687. CE

United States Declaration of Independence: 1776. CE

Invention of a vaccine (Edward Jenner): 1796. CE

Switzerland (Confoederatio Helvetica): 1848. CE

"A Treatise on Electricity and Magnetism" (James Clerk Maxwell): 1873. CE

Electron discovery (J.J. Thomson): 1897. CE

Special theory of relativity (Albert Einstein): 1905.

General theory of relativity (Albert Einstein): 1915.

Salvador Dali "The Persistence of Memory": 1931. CE

"On Computable Numbers" (Alan Turing): 1936. CE

United Nations: 1945. CE

Nuremberg trials: 1945. - 1946. CE

Apollo 11 first human crew Moon landing: 1969. CE

Metaphysics of the Universe - Nature of Reality: 2025.

Sounds of silence

Sound is a wave travelling through the physical medium, either gas, solid or liquid. It is adiabatic (heatless) transfer of an energy between systems. Can waves travel through the Universe? Yes but obviously not the sound waves since there is no physical medium only vacuum energy and underlying field(s). Just special types of waves can propagate across the Cosmos like electromagnetic and gravitational. However, there are exceptions such as primordial plasma and clouds of gas floating around galaxies but we must rescale the sample 57/58 octaves above original pitch, or in other words, 144/288 quadrillion times higher than original frequency.

"Sonification" is a method of data perceptualization. Back in 1971. using Geiger counters space explorers have detected the Cygnus X-1 (HDE 226868), a rotating black hole located approx. 7,200 ly from Earth, producing peak flux density of 2.3 x 10`3 Jy.

Karl Guthe Jansky, one of pioneers of radio astronomy, detected radio waves coming from the constellation Sagittarius in our galaxy Milky Way. Decades later it was found that the source of this radiowaves is a compact, non-stellar object called Sagittarius A* but it was not until 2020. when scientists Reinhard Genzel and Andrea Ghez discovered that it is a supermassive black hole located some 26,000 ly from us. In honor to Jansky, non-SI unit used in radio astronomy for spectral flux density is named after him while duo Genzel&Ghez received Nobel prize in physics.

By combining X-ray, near-IR and mid-IR data obtained by telescopes around the world, Chandra and NASA joint effort interdisciplinary team resynthesized multiwavelenght material into a musical form available at following link:

https://chandra.si.edu/sound/sgra.html

It sounds lyrical, almost like playing harp.

They also translated pressure waves, emitted by supermassive black hole in the Perseus galaxy, that caused agitation in a surrounding gas. What they got is unprecedentedly disturbing noise causing chills in nervous system and temporarily paralysing an unsuspecting individual: deep, creepy roar of an ancient cosmic behemoth capable of devouring an entire galaxy. Please, proceed with extreme caution!

https://chandra.si.edu/sound/perseus.html

Considering its estimated weight of 2 to 5 billion solar masses, Perseus giant is a true relic black hole.

What is the main difference between light and sound waves besides latter being mechanical not electromagnetic? Sound waves have much longer wavelenghts and much lower frequencies. Accordingly, sound waves carry much less energy.

Audio waves were discovered by Leonardo Da Vinci. Galileo Galilei made analysis of sound properties.

Sound speed in air is 330 m/s, in water 1500 m/s, in iron 5000 m/s and in diamond 12,000 m/s. Given values are just approximations because sound speed depends on medium temperature and density.

Wind is movement of air caused by pressure differences arising from unevenly distributed solar heating.

Winds on Neptun can travel at 555 m/s.

Ernst Mach introduced a ratio relating fluid or object`s movement velocity and speed of sound in respective medium, gas or liquid, which can be equal to 1 Mach, subsonic (less than 1 Mach) or supersonic (above 1 Mach).

$$M = v / vs$$

M = Mach

v = fluid or object`s movement velocity

vs = speed of the sound in respective medium

Sonic boom happens when fluid or object`s movement velocity exceeds speed of the sound in respective medium. Light analogy is Cherenkov radiation.

Sound frequency, pitch, is a rate at which waves pass through a determined point.

$$f = v / \lambda$$

f - sound frequency

v - speed of the sound

λ - sound wavelenght

Remember the formula for light frequency?

$f = c / \lambda$

Same formula applies for both light and sound frequency. Basically, wave is a wave.

Human hearing range is 20 Hz - 20 kHz. Frequencies below and above are called infrasound and ultrasound, respectively.

I will use Windows Media Player to play my favourite tune and discover what are properties of the sound.

First thing that interests me is "decibel" unit since we use "volume" effect most often. We already know it describes the loudness of a sample: more decibels mean the sound will be louder while less decibels mean the sound will be lower. Hence, "decibel" unit obviously has to be related to an output power.

$I = p \times v$

I - sound intensity (volume, amplitude or loudness)

p - sound pressure

v - sound speed

Sound intensity SI unit is Watt per square meter (W/m2).

Named after Alexander Graham Bell, decibel (dB) is a unit used for expressing logarithmic function of relative sound intensity or ratio between

sound and reference intensity.

$I = 10 \log 10 (I / I0)$ dB

I - sound intensity

log - logarithm

I0 - reference intensity

Besides volume of sound, (unavoidable) fundamental property and raw in its essence, there is profound one - fidelity - which determines an audio quality, important to music connoisseurs. Achieved through equalizer settings, it is adjustment of dynamic range and particular frequencies level belonging to the same sound, as well as removal of noise.

Destructive Cosmic Events (DiCEs)

DiCEs (Destructive Cosmic Events) are potential catastrophes on cosmic level that can occur but we still have no means to adequately respond.

Twelve (12) Destructive Cosmic Events (DiCEs) listed by an order of the probability - first mentioned are the most probable to happen sooner or later:

1) ASTEROID IMPACT: Huge asteroid(s) coming from outer space. Apophis (340 meters long) will pass dangerously near us in 2029. Sentry Impact Risk Table, operated by Center for Near-Earth Object Studies (CNEOS) located in Caltech, Pasadena, California, is an automated collision prediction system. They say we are safe. Safe? With three hundred forty meter rock above our heads? Read this part: "...as it encounters our planet’s gravitational field in 2029.". It will fly that near? Then it can surely influence Earth`s communications and electronic systems. And we are safe? People will go

insane just watching the twenty (20) Megatone stone getting closer and closer. Another worry I have is that asteroids could actually be camouflaged deep space probes. Do not talk to me about safe. Rather tell me what is an estimated range of its transit - "less than 32.000 kilometers from our planet’s surface". An average lenght between Earth and the Moon is approx. 385.000km. Thirty two thousand is about 1/10 (one tenth) of that lenght: Apophis will pass at one tenth of the lenght between Earth and Moon! Diameter of the Moon is 3,475 km or 3,475,000 m. Divided by 340 we get 10,220 (ten thousand two hundred and twenty) ratio (1:10,220) meaning it will be hard, if not impossible, to see the Apophis with bare eyes. We will need some zooming equipment to see it properly. Smartphones could suffice.

2) SUN (IN)ACTIVITY: a) Solar flare, or even coronal mass ejection (CME), that will disturb planet`s magnetosphere creating powerful geostorms around the globe and disrupt electric power grid and communications. b) Since every star has its lifespan our Sun will too eventually burnout. Luckily, we are talking about several billion years until that happen.

3) GEOMAGNETIC FAILURE: Earth`s boiling core spend available fuel, cool and slows spinning thus removing protective magnetic field that shields us from dangerous cosmic radiation.

4) DEADLY PATHOGENS: There are many potential places of extraterrestrial and Earth origin from where deadly pathogens could emerge: outer space, unexplored systems and planets in our vicinity, Mariana Trench, polar ice or they could be developed in biochemical laboratories around the world. What scares me the most is fact that humanity is utterly unprepared regardless of a significant budget involved. Just look at the Corona virus pandemic: relatively mild virus caused global health, financial and security problems mostly due to two factors - 1) lack of prompt and proper medical response (politics and private interests over public wellbeing) and 2) resistance to vaccination and safety precautions. I ask: "Are you aware what would happen if much stronger virus caught us"? The answer is obvious:"We wouldn`t be here now". Why? Because of disorganized system and human stupidity.

5) NATURE RESPONDS: What if the Universe behaves like a living organism or is one? If imbalance is created at some place than Nature activates its counter measures, its immune system, to restore the cosmic equilibrium. Since humans destroy their entire environment, not just on surface but an underground and sky as well together with associated ecosphere, we can expect more earthquakes, erruptions of lava, tougher microorganisms, global drought or new ice age.

6) EXTRA-TERRESTRIAL INVASION: Alien attack using advanced technology from which we can not defend.

7) ENERGY OUTBURST: Harmful electromagnetic emission from any source other than Sun, which is listed separately, like blast of supermassive black hole jets.

8) COLLISION WITH ANOTHER GALAXY: 3-5 billion years from today, Milky Way is expected to crash with Andromeda (Messier 31). We need a new habitable planet somewhere safe and enough space ships to transfer an entire population. Good news is that we have plenty of time to find solution or we can play game of chance since there is little probability for individual stars to bump at each other due to large interstellar space in-between. However, odds are not promising if we end up on the M31 supermassive black hole course.

9) BLACK HOLES: black holes colliding in our vicinity creating gravitational waves strong enough to push the Earth out of its orbit around the Sun or traveling black hole which will swallow us.

10) COSMIC DISSOLUTION: All stars will get exhausted, black holes will swallow their remains and entire Universe will cool down to an absolute zero leaving nothing behind.

11) NEW COSMIC CYCLE: Reverse expansion (contraction) or The Big Crunch.

12) COSMIC BLEND: New Big Bang happening inside this Universe or in our cosmic neighborhood causing mutual blend and havoc.

Retrospective

An edge of the solitude

I woke up. After a long sleep.

All around me was a darkness. Silence.

I was alone.

I entertained for a while thinking about myself.

Who am I? What is my origin (if I have one)?

In the beginning I only knew that I woke up after a long sleep.

Wherever I moved there was only more emptiness, seemingly infinite void without end and meaning. Nothing.

Then I remembered.

I realized my hidden power! My potential!

I grew taking no Time at all and bursted around creating... Time and Space.

Just... Inhaled and exhaled!

I entangled, unfolded, subdivided, flashed and expanded!

Put your hair in the black hole jets and you will get an impression of my might.

I became everything you see in an entire Cosmos!

I am manifested as an energy. Spirit. Transcended.

Search for me on the outskirts of the spacetime. If you can.

Or search for me in yourself.

Look inside you with your eyes closed.

If there is no end - anything can be a starting point.

Singularity... Growing in energy and density!

Then stretching in all directions.

Maybe I will reach the border one day.

The limit unknown.

Listen the sounds of the Universe.

That is the whisper of creation I left behind.

My silhouette.

The face is far away inside the trenches, among abandoned and forgotten.

Looking toward the horizon, exploring, hoping.

Is there anything on the other side?

Is there... An edge of the solitude?

(26/04/2023)

I am always ready and willing to forgive. But who must forgive whom, in what sequence and for what exactly? How did events unfolded before your particular, biased line of sight proclaimed me of being the only contributor to an environmental demise? You forgot about the root of the problem.

Send your strongest armies, the limitless void is waiting. Gather your best troops, It needs none to counter. Weaponize yourself as much as you want, It will eat you alive and spit dead squashed together with your advanced military technologies.

It knows who you are. It can read your thoughts. It sees your deepest secrets. It recalls evils you have done. And when the time comes you will make amends. It is called a reincarnation cycle where death is an unavoidable condition serving as a transition point not at all the final act.

Do you want to know how I feel? I am soaked in the sorrow which is tearing me apart synchronously from inside out and in reverse, intensifying with every new round of torment in a manner of perpetual, never ending circle of agony.

I will always remember you, my love. I will never forget the days we spent together.

And I will always carry a seal of the guilt stamped in my heart with burning iron.

About author

I was found guilty for not doing the things out of my job description and under particular circumstances. As phone operator, I was payed to connect phone calls because state was too cheap to invest in automated service. They bought it after I left and when person of proper lineage replaced me which points to the fact that everything was staged. I cited e-mail adress, or helped anyway I could, to those who said they were old or handicaped. I refused to cite e-mail adress to young, physically healthy individual who already spent half an hour of my working time blocking line for tens of other parties, citizens with legitimate requests, asking for judicial case that he was not involved with. During communication I found that he was typical provoker whom I regularly encountered since I had to talk with different profiles from petty criminals to sentenced lunatics. Question remains, why haven't bureaucratic instances making decision checked evidence in the course of respective ethical process? They just read the papers and concluded that I am guilty. I wasn't allowed to verbally present my defense, not even after I invested an appeal. What kind of process is that? Kafkian. All they had to do to determine my innocence were two simple things. First, check the file case number provided by person who reported me. That file case is unrelated to this specific person. Moreover, with respect to the service regulations, this specific person wasn`t eligible to be informed about that file case because he was not an involved party. He hasn`t even been an interested party. That file case was divorce lawsuit with totally different parties involved. Meaning, I was punished because I respected the judicial codex. Second, ask the question how can two female witnesses hear the phone call I had with the person who reported me? We were two floors apart. Obviously, they were lying. Why? Because I had to be removed. I can think of three reasons. Having foreign roots and being religious sceptic, I was considered undesirable among chauvinistic mob. Then, I respected the law which is an obstacle for corruption native to Balcan area. Third, incompetence of bureaucratic hierarchy. My best guess is that all three factors contributed equally.